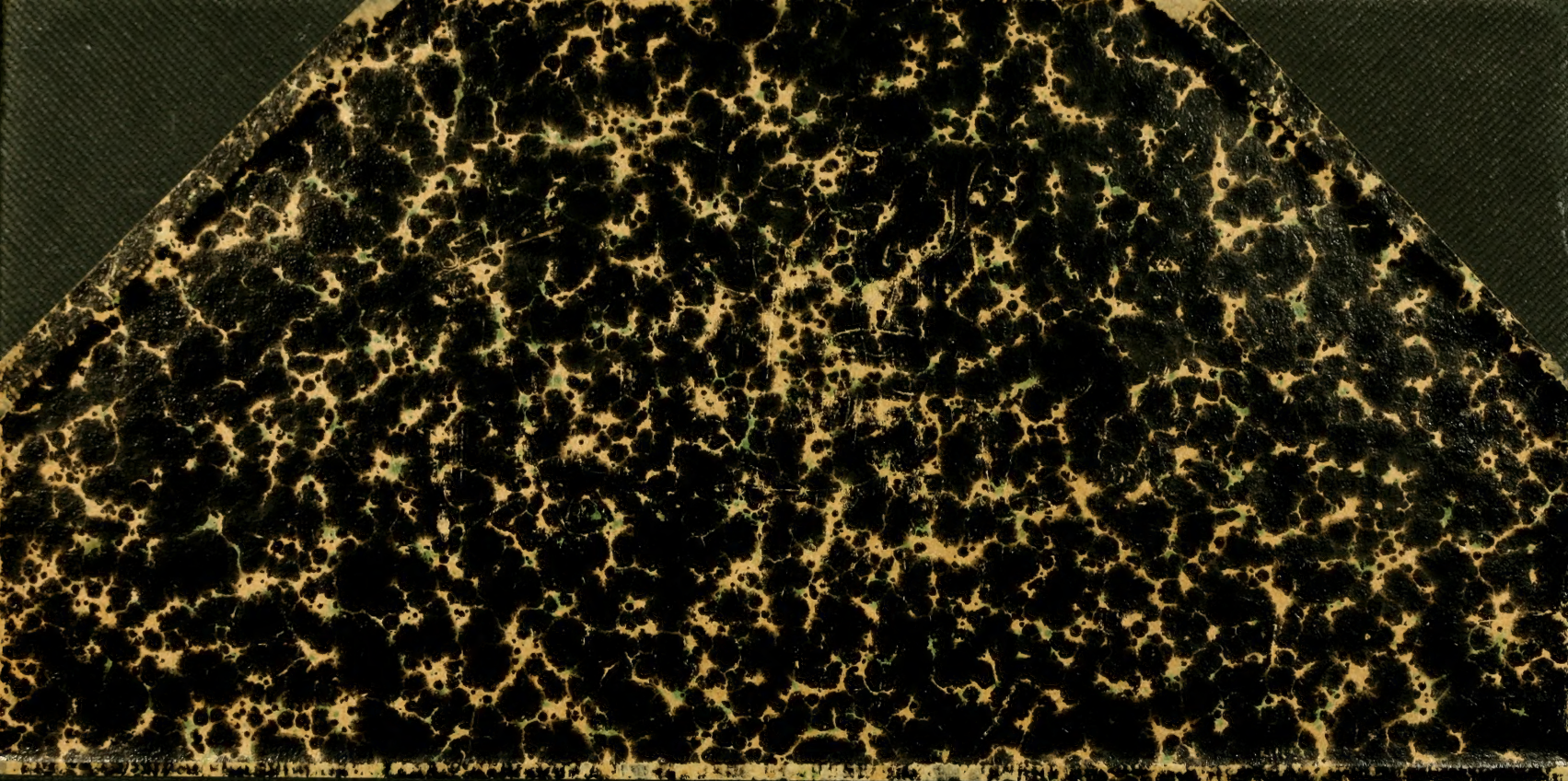

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# AMERICAN

# JOURNAL OF CONCHOLOGY.

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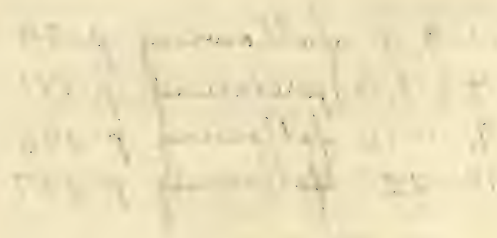

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# AMERICAN

# JOURNAL OF CONCHOLOGY.

## NEW SERIES.

PUBLISHED BY THE

CONCHOLOGICAL SECTION of the Academy of Natural Sciences of Philadelphia

VOL. VI. **1870–71.** PART 1.

*Meeting Jan. 1st*, 1870.

Eight members present.

DR. RUSCHENBERGER, Director, in the Chair.

Donations to the Museum and Library were announced.

The following papers were read by title, and referred to Committees:

"Remarks on the Species of Melania and Limnea inhabiting the Hawaiian Isles, with descriptions of new species;" by Wm. Harper Pease.

"Notes on the Mollusca of Monterey Bay, California;" by Dr. J. G. Cooper.

---

*Meeting Feb. 3d*, 1870.

Nine members present.

DR. RUSCHENBERGER, Director, in the Chair.

After several donations to the Museum and Library were read, the following papers were offered for publication in the Journal:

"Materials toward a Monograph of the Gadiniidæ;" by Wm. H. Dall.

"Descriptions of new Bivalve Mollusca in the collection of the Academy of Natural Sciences. No. 2;" by Geo. W. Tryon, Jr.

"Note on Cyclophorus foliaceus, Reeve, and C. Leaii, Tryon;" by Geo. W. Tryon, Jr.

"Catalogue of the Shell-bearing Mollusca of Fulton County, Illinois;" by John Wolf.

---

*Meeting March 3d*, 1870.

Nine members present.

Mr. Tryon, Vice-Director, in the Chair.

Donations to the Museum and Library were read.

The following papers were read by title, and referred to Committees:

"Catalogue of the known Recent and Fossil Species of the Family Marginellidæ;" by John H. Redfield.

"Remarks on the Anatomy of the genus Siphonaria, with description of a new species;" by Wm. H. Dall.

"Notes on Recent and Fossil Shells, with descriptions of new species;" by T. A. Conrad.

"Notices and Reviews of New Conchological Works;" by Geo. W. Tryon, Jr.

In presenting his Catalogue for publication, Mr. Redfield made the following remarks upon the family Marginellidæ:

The earliest figures of Marginella which I know are found in Bonanni's Recreations, in 1684. He figures *three* species,—*M. cingulata*, *M. persicula* and *M. glabella*,—all Gambian.

Lister, in 1688, figures rudely the same species, and *four* others,—viz.: *M. faba*, *M. pulchra?* *M. elegans?*, and *M. pyrum*,—one of them West African, one Caribbean, and the others from Indian Ocean.

In 1691 Bonanni first figures the large Brazilian species *M. bullata*.

Sloane, in 1707, indicates the well known West Indies species, *M. guttata*, which, however, was not figured until 66 years afterwards.

Petiver about 1711 gave figures of *two* other species; they are rude, but best answer to *M. rosea* and *M. Delessertiana*, the one from South Africa, the other from Mauritius.

Adanson added five species, all (perhaps with one exception) West African.

Thus sixteen species had been indicated before the publication of the tenth edition of Linnæus' Systema Naturæ, which work includes but six of these species, compressing them, however, into five, to which another was added in the twelfth edition.

Martini in 1773 added figures of four species to those already made known, and before the century closed about seven more were figured, making in all about thirty species known at the close of the last century.

The Napoleonic wars were not favorable to the progress of science, and the next twenty years added but four species to the list. Dillwyn's Catalogue of 1817 enumerates but eighteen species, though thirty-four had been figured or named in various works. Lamarck, in his Anim. sans Vert., in 1822 added five more, and yet enumerates but twenty-six, *Volvaria* included.

From Lamarck's time downward, the addition of new species to the list has been so rapid that it would be tedious to particularize them. About fifty-eight new ones were published from 1825 to 1845, inclusive; and Sowerby, with others, added twenty-nine in 1846, since which time about one hundred more have been made known, making the total number of catalogued species at the present time about two hundred and twenty-eight.

The earliest fossil species known were *Marg. ovulata* and *Volvaria bulloides*, figured in Enc. Meth. in 1798. None were added until the present century, and now about fifty species are known which are exclusively fossil.

### Distribution of Recent Species.

| | *Marginella.* | *Erato.* |
|---|---|---|
| Caribbean, | 55 | 2 |
| Mediterranean, | 5 | 1 |
| West African, | 34 | |
| South African, | 14 | 1 |
| Indo-Pacific, | 41 | 11 |
| Australo-Zealandic, | 14 | |
| Panamic and Peruvian, | 10 | 4 |
| Unknown, | 35 | 1 |
| | 208 | 20 |

### Fossil Species.

| | *Marginella.* | *Erato.* | *Volvaria.* |
|---|---|---|---|
| Miocene, | 25 | 1 | |
| Oligocene, | 9 | | |
| Eocene, | 13 | 1 | 2 |
| Cretaceous, | 1? | | |
| Unknown, | 1 | | |
| | 49 | 2 | 2 |

## REMARKS ON THE SPECIES OF MELANIA AND LIMNÆA INHABITING THE HAWAIIAN ISLANDS, WITH DESCRIPTIONS OF NEW SPECIES.

BY WM. HARPER PEASE.

Having made extensive collections of the species of the above genera the past year, on several of our islands, especially Kauai, which is by far the best watered of our group, I furnish herewith the facts I have been able to gather.

### LIMNÆA, Brug.

Eight species of this genus have been described as inhabiting the Hawaiian Islands, viz:

*L. Oahuensis*, Soul., *volutata*, Gld., *Sandwichensis*, Phil., *affinis*, Soul., *rubella*, Lea; also, *Physa producta*, Migh., *umbilicata*, Migh., *reticulata*, Gld.

Having examined the animals of several hundred specimens, from various localities, I am confident that no species of *Physa* inhabit the islands, however closely the shells may resemble that genus.

The animals of the several species above differ but little in their general shape and proportions. The foot extends beyond the head when in motion. When the animal is at rest or feeding the tentacles are subulate, somewhat flattened laterally, and swollen at their inner bases, on which the eyes are situated. When fully extended they assume a cylindrical shape, sharply pointed, and the protuberance at the base scarcely perceptible. The mantle does not project outside the shell.

Sinistral and dextral specimens of the same species are found in company with each other; the latter are rare at all localities.

All the species may be referred to two types, which may be distinguished by the characters of their columella.

1. Represented by *Oahuensis*, Sowb., the columella furnished with a fold, more or less twisted, and, with few exceptions, either colored or stained reddish, which includes the following species:

L. OAHUENSIS, Soul.

1830. *L. Oahuensis*, Soul., Voy. Bonite, Vol. 2, p. 527, pl. 29, fig. 38—41.
" *L. affinis*, Soul., Voy. Bonite, Vol. 2, p. 528, pl. 29, fig. 42—44.
1842. *L. Sandwichensis*, Phil., Archiv f. Naturg.
" " " Chemn., 2d ed., pl. 4, fig. 25–26.
1847. *L. volutata*, Gld., Proc. Bost. Soc., Vol. 2, p. 211.
1852. " " Am. Expl. Exp., p. 122, fig. 142.

L. RUBELLA, Lea, plate 3, figs. 1—2.

1843. *L. rubella*, Lea, Trans. Am. Phil. Soc., Vol. 4, p. 12.

This species inhabiting the Island of Kauai may possibly prove to be a var. of *Oahuensis*. It differs from that species in color, and varies very widely in shape.

At some localities its whole surface is beautifully reticulated, thus connecting it with the following species:—

L. RETICULATA, Gld.

1847. *Physa reticulata*, Gld., Proc. Bost. Soc., p. 214.
1852. " " Am. Expl. Exp., p. 118, fig. 140.

L. UMBILICATA, Mighels.

1845. *Physa umbilicata*, Migh., Proc. Bost. Soc., Vol. 2, p. 21.

I have not met with any umbilicate specimens of this genus on the Islands.

L. PRODUCTA, Mighels.

1845. *Physa producta*, Migh., Proc. Bost. Soc., Vol. 2, p. 21.

The two species described as above by Dr. Mighels must probably be abandoned. The types were destroyed by fire, and I cannot discover any specimens in other collections in the United States. It is impossible to identify them from the descriptions.

2. The columella of the following species differs from that of the above in being straight, simple, generally flattened, and white. They may have escaped notice heretofore, the first for reason of its variety, and the other two from their small size.

L. TURGIDULA, Pease. Plate 3, fig. 3.

T. solidiuscula, ovata, striis incrementis tenuiter notata; transversim minutissime striata; anfr. 5, convexis, ultimus turgidulus, $\frac{1}{3}$ longitudinis testæ fere æquans; sutura impressa; spira

acuta; apertura oblongo-ovalis; columella subrecta, planulata, ad umbilicum vix everta, alba; fusco rubida, interdum rufo-cornea.

Long. 15, Diam. 8 mill.

*Hab.* Oahu.

L. COMPACTA, Pease. Plate 3, fig. 4.

T. elongato-ovata, solidiuscula, nitida, lævi, sinistrorsa, flavescente-cornea, interdum albida; anfr. 5, convexis; apertura oblongo-ovata; columella vix arcuata, planulata, simplex, callosa, alba.

Long. 7, Diam. $3\frac{1}{2}$ mill.

*Hab.* Oahu.

L. AMBIGUA, Pease. Plate 3, fig. 5.

T. tenui, ovata, sinistrorsa, lævi, nitida, interdum transversim obsolete tenuiter striata; spira acuta; anfr. 4–5, convexis, ultimus vix turgidulus, interdum superne rotundato-angulatus; sutura impressa; apertura oblongo-ovata; columella vix arcuata, callosa, infra everta, expansa, alba, cornea, rarissime rufescenti-cornea.

Long. 10, Diam. 6 mill.

## MELANIA, Lam.

M. MAUIENSIS, Lea.

1856. Proc. Phil. Acad. Nat. Sci., vol. 8, p. 145.

The above, described from specimens collected on the Island of Maui, is also found at Oahu, but is most fully developed on the Island of Kauai, where it attains to the size of 40x15 mill. It is finely compressedly ribbed transversely, interstices concave, and striate longitudinally. The ribs of the spire, and generally those on the upper part of the last whorl are granulose.

M. NEWCOMBII, Lea.

1856. Proc. Acad. Nat. Sci., Phil., vol. 8, p. 145.

M. VERREAUXIANA, Lea.

1856. Proc. Acad. Nat. Sci., Phil., vol. 8, p. 144.

I have met with no specimens which answer to the description of the above species. It is described as smooth, without mention of striæ or plicæ.

M. KAUAIENSIS, Pease. Plate 3, fig. 6.

T. crassa, elongata, tenebro-fusca, aut fusco-cornea; spira turrita, supra longitudinaliter curvato-plicata; anfr. 8–9, plano-convexis, transversim impresso-striatis; apertura oblongo-ovata, postice angulata, ad basin rotundata, intus olivacea; labro acuto: columella vix arcuata, lævi; operculo nigricans.

Long. 50, Diam. 15 mill.

*Hab.* Kauai.

Same type as "*M. Newcombii.*"

M. CONTIGUA, Pease.

T. elongata, tenui, omnino transversim regulariter tenuiter sulcata aut impresso striata, cornea; sutura impressa; anfr. 8, planulatis; apertura elongato-ovata, superne angulata, intus albida; labro acuto; columella vix incurva: operculo fusco.

Long. 28, Diam. 9 mill.

*Hab.* Kauai.

Also allied to "*M. Newcombii.*" It is not plicate and regularly finely grooved or striate throughout.

## MATERIALS TOWARD A MONOGRAPH OF THE GADINIIDÆ.

BY W. H. DALL, SMITHSONIAN INSTITUTION.

The genus *Gadinia* was instituted by Gray in 1824, for the *Patella afra* of Gmelin. In 1840 he instituted for it a special family. In his early publications on the subject, he rightly placed it near *Siphonaria* in his classification. Afterwards, misled by the erroneous description of Philippi, he referred it to the *Cervicobranchiata*, with *Tectura* and *Scurria* which have the gills over the neck, and *Lepeta* which has no gills. Most other authors have followed Gray.

The Messrs. Adams combine in the sub-order *Edriopthalma* the *Chitonidæ*, the *Dentaliidæ*, *Fissurellidæ*, *Tecturidæ*, *Lepetidæ* and *Gadiniidæ*, thus reaching a climax of confusion rarely equalled. Chenu, as usual, follows the Messrs. Adams, but unites a fossil genus (whose affinities are clearly with *Emarginula*, etc.) with *Gadinia* in the *Gadiniidæ*.

Keferstein, with a singular misapprehension of its affinities, places *Gadinia* in the *Acmæidæ* and refers it to the *Tænioglossa*.

A more thorough examination of the soft parts than that afforded by the single specimen of Dr. Philippi, shows that the first conclusion of Dr. Gray was much nearer the truth than any subsequent references.

It is a true pulmonate, breathing air by means of a lung and unprovided with gills of any kind. The anatomy shows affinities with the *Auriculidæ*, and the dentition has relations with that family, but more strongly with that of the *Siphonariidæ*.

### Order PULMONATA.

### Sub-order *BASSOMATOPHORA*.

### Family GADINIIDÆ, Gray.

#### Genus GADINIA.

Syn. *Gadinia*, Gray, Tilloch's (London) Philos. Mag. lxiii, 1824, pp. 274--277. Isis, von Oken, Heft v, col. 460, 1834. *Mouretia*, Sby. (nec Gray), Proc. Zool. Soc. 1835, p. 6.

*Muretia*, D'Orb., Voy. Amer. Meridionale, v, pp. 470, 682 (pars).
*Siphonaria*, D'Orbigny (non Sby.), Ibid. pp. 470, 682, 741.
*Clypeus*, Scacchi (non Brod.), Osserv. Zool. 1833.
*Gardinia*, Pictet, Traite de Paleon. vol. iii, p. 293, 1855. (err. typog.)
*Rowellia*, Cooper, Proc. Cal. Acad. Nat. Sci. 1865, p. 188. (= *Gadinia* jun.)
*Gadinia*, H. & A. Adams, Gen. Rec. Moll. i, p. 463. Chenu, Man. de Conchyl. i, p. 375, et auctores omnes nov. q. v.
*Pileopsis* (sp.), Payr, (non Lam.), Catal. 1836.
*Lepas* (sp), Adanson, Hist. Nat. du Senegal, 1757, p. 33.
*Patella* (sp), of the older authors.

Testa univalvis, non symmetrica, oblique conica; vertice obtuso, subpostico apertura suborbiculata, irregularis; cavitas simplex, sulco in latere dextro, prope limbum anticum impressionis muscularis; impressionis muscularis elongata arcuata submarginalis. (Gray.)

*Animal* pulmone distincto præditum, branchiis nullis; rostro bifido, infundibulato.

*Type.*

GADINIA AFRA, Gray.

*Patella afra*, Gmelin, 3715. Dillwyn, Rec. Shells ii. 1046. Hanley's Wood's Index Testac. pl. xxxvii. fig. 65*a*.
*Gadinia afra*, Gray, Tilloch's (London) Phil. Mag. lxiii, 1824, pp. 274, 277. Isis, von Oken, Heft. v, col. 460, 1834. H. and A. Adams, Gen. Rec. Moll. i, p. 463, vol. iii, pl. lii, fig. 8, a. Chenu, Man. de Conchyl, vol. i, p. 375, fig. 2818.
*Lepas gadin*, Adanson, Hist. Nat. du Senegal, (Genus *Lepas*, species "*Le Gadin*"), p. 33, pl. ii, fig. 4.

G. afra testa oblique conica, alba, radiatim striato-costata, subsquamosa, vertice sublævi, marginibus crenulatis.

*Hab.* West coast of Africa.

This is the typical species. The name of the genus is derived from Adanson's trivial name. He found it on the rocks of the island of Goree and at Cape Manuel on the adjacent coast of Africa. He says they were particularly abundant from January until May. At that time they may change their station for the purpose of depositing their ova. He does not describe the animal.

GADINIA GARNOTII, Payr.

*Pileopsis Garnotii*, Payr, Coq. Corse, pl. v, figs. 3, 4. Phil. Enum. Moll. Siciliæ. Philippi, Wiegm. Archiv. fur Nat., i, 1839, p. 115, pl. iii, fig. 3, a, b.

*Clypeus Garnotii*, Scacchi, Catalogus, p. 17.

*Gadinia Garnotii*, Gray, Figs. Moll. Anim., p. 93, vol. iv. Pl. 110, fig. 4. Gray, Guide to Moll. p. 172. H. and A. Adams, Gen. Rec. Moll. i, 463, pl. 52, fig. 8.

G. Testa alba, ovata, conica; radiatim striato-costata. Vertice subpostico; intus lævissimi, margine denticulato.

*Hab.* Living in the Mediterranean, and fossil, in the Tertiary quaternaries of Sicily.

The single specimen of Dr. Philippi afforded him material for some anatomical notes upon the animal. Either there is a very great difference between this and the Pacific species, or the paucity of material led him into error. He has apparently taken the renal organ for a gill, and, in this manner, led later authors into the error of placing *Gadinia* among the *Cervicobranchiata*.

GADINIA STELLATA, Sby.

*Mouretia stellata*, Sby., Proc. Zool. Soc., 1835, p. 6.

*Gadinia pentegoniostoma*, Sby., teste Cpr., 16th Rep. Brit. Assoc. 1856, pl. vii, fig. 3, a to g. (Not of Angas, P. Z. S. 1856, p. 220.)

G. testa depressa, squamiformi, alba, radiatim-costata; margine dentato.

*Hab.* Real Llejos C. Am. and the Gulf of California.

Seven varieties of this very variable shell are figured by Carpenter, in his first Report on the West Coast Mollusca.

GADINIA PERUVIANA, Sby.

*Mouretia peruviana*, Sby., Proc. Zool. Soc. 1835, p. 6. Ib. Zool. Beechey's Voy. p. 147, pl. 39, fig. 1.

*Gadinia peruviana*, Woodw., Man. Rec. and Fos. Shells, p. 155, pl. xi, fig. 26.

*Siphonaria peruviana*, D'Orb., Voy. Am. Mer. v, p. 470.

G. testa subdepressoconica, alba, radiatim striata; vertice centrale; epidermide cornea tenui.

*Hab.* Cobija, Peru.

This is not the type of the genus, nor was it described by Gray, as Woodward states. It is the first of three species of *Gadinia* described under the name of *Mouretia* by Sowerby, P. Z. S. 1835.

GADINIA COSTATA, Krauss.

*Mouretia costata*, Krauss. Sud afrischen Mollusken, Stuttgart, 1848.

*Gadinia costata*, (Krauss,) H. and A. Adams, Gen. Rec. Moll, vol. i, p. 463.

I have not been able to examine specimens or have access to description or figure of this species, which is from South Africa.

GADINIA CONICA, Angas.

*Gadinia conica*, Angas, Descr. of new sp. of Moll. from N. S. Wales, in Proc. Zool. Soc. 1867, p. 115, No. 127, pl. xiii, fig. 27. List of Port Jackson Moll. P. Z. S., 1867, p. 220.

G. testa alba, conica; costis fortioribus, irregularibus, radiantibus xxxviii; extus rugis concentricis fortibus, intus alba.

Convexly conical, white; strongly irregularly radiately ribbed; ribs about thirty-eight in number, concentrically ridged. Apex sub-central, white within. Alt. $2\frac{3}{4}$ lines, lon. $3\frac{1}{2}$ l., lat. 3 l.

*Hab.* Coodgee Bay, outside Port Jackson heads; (Angas).

The figure which accompanies the above description appears to represent a young shell. The concentric ridges are prominent, almost frills.

GADINIA ANGASII, Dall.

*Gadinia pentegoniostoma*, Angas, (non Sby.), List of Port Jackson Moll., Proc. Zool. Soc., 1867, p. 220.

G. testa depressa, conica, alba; costis crebrerrimis radiantibus; intus lævissime.

A depressedly conical, white shell; strongly radiately ribbed and polished inside. Length nine lines. Coodgee Bay, outside Port Jackson heads; (Angas).

The specific characters of all the species of *Gadinia* are so faintly marked, that in the absence of information in regard to the local habitation, many, if not all the species, might readily be confounded. It may safely be assumed, however, that *Gadinia pentegoniostoma* + *stellata* Sby., from Middle America and the Gulf of California, is not identical with a species, however similar, from a totally distinct zoölogical province. If not the adult of the preceding species, nor an importation, it may take the name of *G. Angasii.*

GADINIA RETICULATA, Sby. Pl. 2, figs. 1 to 9. Pl. 4, figs. 1, 2, 3.

*Mouretia reticulata*, Sby., Proc. Zool. Soc., 1835, p. 6. (Hab. Valparaiso, in err.)

*Gadinia reticulata*, H. & A. Adams. Gen. Rec. Moll. i, p. 463.

*Rowellia*, sp. Cpr., Suppl. Rep. Br. As., 1863, p. 651.

*Rowellia radiata*, Cooper, Proc. Cal. Ac. Nat. Sciences, 1865, p. 188, (test. jun.) Geogr. Cat. Moll. p. 24, No. 460, 1867.

*Siphonaria reticulata*, D'Orb., Voy. Am. Mer. v, p. 682.

Testa subcircularis; apice centrali; colore albo vel ex albo virens; superficies xxx costis radiantibus dichotomis induta, per lineas concentricas cruciatis; intus alba vel livida. Margine simplice; in jun. crenulato; fovea siphonali bene impressa, margine prope extremam foveam, parum inciso.

Shell normally almost circular; depressed conical; white or livid, sometimes tinged by the growth of a green or pink nullipore. The upper surface marked with from thirty to fifty radiating striæ or riblets, which are reticulated by the coarse, somewhat elevated lines of growth. The margin in young shells is denticulated, but with age this character is lost. The edge is usually irregular and owes its form to the locality where the animal was stationed; the notches corresponding to the irregularities of the surface where the animal lived. The interior is usually polished, except on the muscular impressions, which are granulous and strongly impressed. The scar is horseshoe-shaped, the right anterior limb broad near its extremity. Close to the anterior extremity of the left limb is a small oval scar indicating an attachment of the mantle to the shell.

The apex is posteriorly curved, sub-central, smooth, and in the youngest specimens I have seen exhibits no tendency to spiral growth. In older specimens it is usually somewhat eroded. The texture of the shell is exceedingly solid, porcellanous and strong. Old individuals fill up the cavity of the apex while adding to the margin. From the irregularities of their stations most fantastic forms occur. The most elevated specimen had an altitude of 0·45 in. to a longitudinal diameter of 0·56 in. One of the most depressed measured 0·36 in. high and 0·98 in. long by 0·96 in. wide. In one old specimen the thickness of the shell at the apex was 0·32 in. The young shells are usually quite thin, averaging about 0·04 in.

My specimens were identified by Dr. Cooper as his *Rowellia radiata*. The living specimens obtained by him were very young. The adults were examined by Dr. Carpenter, who is disposed to consider them identical with Sowerby's species, which came from Lower California.

*Soft Parts.* The external parts are of a livid white. The

foot is almost circular, tough and muscular, without any sinus, tubercles or other appendages. The animal appeared to have the power of inflating the cellular tissue between the epidermis and the sides of the foot, in such a manner as to have the appearance of blisters. These protuberances are persistent in alcohol, though they do not exist in the normal condition. In alcoholic specimens such might readily be taken for lobes or expansions of the foot. The mantle edge is simple, broad and continuous. It is thickened on the right side above the head, and in this thickened portion is the opening of the pulmonary chamber. It is angular, very minute and closed by a small triangular valve or lobe. The head is broad and flattened. There are no tentacles, or rather the tentacles are consolidated and lost in the expanded lobes of the muzzle. The latter is bifid, and the outer extremities are produced into two funnel-shaped expansions, which I will call "ears." The ears are not continuous, but their inner ventral edges overlap one another, while their dorsal edges are separated at their points of insertion by a space as wide as the mouth, which is situated just below in the centre of the double funnel. The edges of the ears in the adult are simple, but, according to Dr. Cooper, in their young state they are flattened and pectinated. In the adult their inner surface is marked with moderately conspicuous folds radiating from the mouth. Their exterior surface is smooth.

The eyes are very minute and black; they are situated on the sides of the head just behind the ears. In alcoholic specimens, on account of the opacity of the cuticle, they are invisible, but may easily be found by shaving off a thin paring of skin with a sharp knife.

On the right side between the mantle and the foot is a small papilla, indicating the genital orifice. Just behind the right eye is an almost invisible foramen, exceedingly minute, through which the verge is exserted.

The mantle and foot exude a peculiar milky slime, with a strong soap-like odor.

The head is capable of considerable extension and retraction.

*Muscular System.* The foot is composed of solid muscular fibre, radiating from a median line. The superior surface, when the viscera are removed, is opalescent. The adductor muscles are horseshoe-shaped and continuous. The anterior right hand limb is broader at its extremity, which is rounded. The edges of the muscular impression are somewhat irregular. The faintly marked sinus passes close to the anterior extremity of the muscle on the right. On the left the mantle is attached to the shell, forming a small oval impression, which is not continuous with the scar of the adductor.

The buccal mass is controlled by well marked muscles. A broad muscular ribbon is attached to the posterior concavity of the adductor, a little on the right. About midway in the cavity of the viscera it divides into two parts, one of which is fixed on each side of the superior surface of the buccal mass. A similar but more slender muscle is similarly attached below. Three stout bundles of muscular fibre are attached anteriorly on each side to the front of the foot, and posteriorly to the sides of the buccal mass, which they serve to extend outwards, while the long muscles serve for retracting it.

A short stout muscle binds the buccal body to the foot, behind and somewhat below the protractors, on each side.

A long and very slender fibre connects the posterior end of the penis with the spermatic canal behind the prostate.

The protractor muscles of the penis are short and thin, blended somewhat with the fascia of the preputium. The muscles of the female organs will be hereafter described.

*Nervous System.* This, in the alcoholic specimens, could not be thoroughly traced out. The nervous collar around the œsophagus at the posterior end of the buccal body consisted of two superior ganglia connected with two inferior ganglia and with each other, by nerve fibres. Above, these appeared somewhat reticulated; below they diverged without inosculation. A rather stout nervous cord extended back from the lower ganglion on the right, parallel with the spermatic cord, and provided with an accessory ganglion near the prostatic gland. The nerve fibres, as well as the blood vessels which supply the foot, enter it at or near the buccal mass, on the median line.

*Circulatory and Respiratory Systems.* Philippi (in his description of the soft parts of *Pileopsis Garnotii*, Payr,) says that a crumpled organ hangs from the lining of the pulmonary chamber, which is "evidently the gill." He admits that he had only a single specimen, in which several of the organs were indeterminable. His figure is extremely indefinite, and is further complicated by the outline of the head, which is represented, on a small scale, as seen from below, while the remainder of the same figure represents the back, on a large scale, as seen from above! His representation of the "gill" is unlike anything in the species now under consideration, though his "gill" occupies the place of the renal organ of the latter. His account must therefore be regarded as erroneous, the error doubtless being due to the small amount of his material.

The present species is a true Pulmonate. The pulmonary chamber extends over more than half the body, reaching the adductor muscle on the left side behind, and thence forward

with the opening as previously described to the right of the head, in the mantle margin. The buccal organs and viscera are separated from the chamber by a tough membrane, which lines the latter. The lung is leaf-shaped, and included between the lining of the chamber and the inner surface of the mantle; to the left of the lung between the membranes are a series of solid, flattened lobes, which empty by a duct near the pulmonary papilla. These are analogous with the renal organ of *Melampus*. They do not project into the chamber, nor have they any resemblance to a gill. The lung terminates in a bifid papilla just within the opening in the mantle. In the posterior part of the lung is a capsule which contains the heart. The suture between the auricle and ventricle is very strongly impressed. The heart is closely connected with a network of large blood vessels, from which branches penetrate the tissue of the lung, and the smaller capillaries anastomose between the membranes beyond the edge of the lung in the most delicate and beautiful manner. Dr. Leidy, who examined the organ, had no doubt as to its being a true lung.

Several large vessels supply the liver and buccal region, and the smaller vessels enter the foot below the buccal mass.

*Alimentary System.* The mouth is transversely oval, capable of considerable dilatation, with numerous rugæ, parallel with the axis of the throat, when contracted. There is no jaw. The buccal mass is smaller and less muscular than in most pulmonates.

The radula contains about four hundred rows of teeth; the lateral rows forming a sharp angle with the rhachis. The formula is about 110·1·110, so that the odontophore contains about 88,400 teeth. The nearest relations of the dentition appear to be with *Siphonaria*. The rhachidian tooth is minute, inconspicuous, with an ill-defined cusp. The outline of the base is hardly perceptible. The cusp is short, oval and pointed. The edges of the base are slightly thickened. The bases of the inner laterals are obliquely rhombiform. The cusp consists of one long prominent tooth, flanked on each side by a slender, needle-like, minute, transparent denticle. These are very liable to be overlooked from their extreme transparency and small size. They are shorter, proportionally, toward the edge of the radula. Occasionally the main point of the cusp is bifid, or the smaller points are blended more or less with it; these forms, however, are evidently abnormal.

(It is noteworthy in cases, such as this, when the radula contains a large number of similar and minute teeth, that the tendency to variation among them is much greater than when the

radula is much narrower and contains fewer teeth. The same generalization holds good in regard to the individual teeth. The larger the number of denticles on the cusp, the greater the tendency toward variation among them. In working over the dentition of the Pulmonata, especially, it is very desirable that as large a number as possible of ribbons of each species should be compared to correct such errors of variation from the normal type.)

The main point of the cusp in the inner laterals is about twice as long as the base; it becomes proportionally shorter toward the edges of the radula.

All the denticles or teeth of the cusps are sharply pointed. About the seventy-fifth lateral the edges of the cusp on each side of the prominent denticle are slightly notched, and the two small denticles are almost evanescent. These notches disappear about the one hundredth lateral, and the long tooth gradually decreases in proportional length, until in the extreme outer laterals it is not more than half as long as the base.

The œsophagus leaves the buccal body above and before the posterior extremity of the latter, and is slightly dilated there.

It enters the ventral side of the stomach with a short double flexure. The stomach is oval in shape, and in all the specimens dissected was filled with a dark green vegetable matter. Leaving the stomach at the posterior end, the intestine turns upon itself and passes over the superior surface of the liver, diagonally across the body, terminating just inside the opening in the mantle. The sinus in the shell is due to the anterior extremity of the lung, and does not quite correspond with the course of the rectum. The latter half of the intestinal canal is divided interiorly by incomplete septa, which serve the purpose of expelling the fæces in oval pellets.

*Reproductive System.* The ovary is situated to the right of, and below the stomach. It consists of a number of convoluted tubes, more or less spirally twisted upon each other. The oviduct is short, and provided with an accessory mucous gland. Near the anterior extremity of this a small muscle is attached, and is fixed at the other end to one corner of the nearly triangular vagina. The uterus is a kidney-shaped organ, and the duct passing from it into the vagina is provided with a genital bladder as in other Pulmonates. The vagina terminates in a small papilla externally. In small specimens this is almost invisible.

The exact extent of the testicle was not clearly made out, but it is very slender and situated at the posterior end of the animal, in or upon the surface of the liver.

The vas deferens is long and slender, passing through a pear-

shaped prostatic gland about midway of the body, it is prolonged to the penis.

The latter is long and larger at its posterior extremity, growing more filiform anteriorly. The foramen opens on the side of the neck, just behind the right eye, and is of extreme minuteness. A slender retractor muscle is attached to the posterior end of the penis, and at its other extremity to the vas behind the prostate. The protractors are on the right side of the penis, shorter and stouter than the retractor.

*Special Organs.* The specimens were so much contracted by the alcohol that no auditory capsule was visible. The eyes are minute, oval and black. The liver occupies nearly half of the visceral cavity. Part of it was a light brown, and part was whitish. No differences of structure or line of separation could be made out under a very high power.

Two small pear-shaped salivary glands are attached to the upper posterior surface of the buccal mass.

In the form of the verge, the renal organ, lung, muscular bands and other particulars, the general structure of this mollusk recalls *Melampus*, as figured by Souleyet.

*Habitat.* Close to high water mark on the rocky beach between Point Pinos and Point Cypress, near Monterey, Cal., I noticed a colony of forty-eight individuals. They were stationed pretty close together, on the rounded under side of a large, perfectly clean, granitic boulder. In calm weather and during ordinary tides they would have been dry at high water.

While refreshing myself after my morning tramp, I sat down on the beach, as the tide was falling, and watched the colony.

As long as the rock on which they were remained damp, they continued with the margin of the shell firmly applied to it. The shells were notched and emarginated to correspond with the rugosities of the stone, and adhered to it so firmly as to be immovable, unless great force was applied.

There was absolutely nothing on the rock which could have supplied them with food.

As soon as the boulder became dry, under the hot sun, I perceived a simultaneous motion in the colony. Each shell was raised above the surface of the stone, the head and foot were protruded, and the orifice of the pulmonary cavity was expanded. They were evidently enjoying the warm air. Some of them began to move, and I thought that they were about to descend to the pebbles below, where an abundance of soft green algæ offered an inviting repast. Their motions were so slow and my time so limited, however, that I made a prize of the whole colony with-

out further delay. They evidently moved about to obtain food, and by some mysterious instinct returned to their stations before high tide. The margins of the shells showed that they must have been formed by the peculiar inequalities of the station where I found them. Some of them had lost their way at times, as the lines of growth showed, where sudden changes had taken place in the curves of the margin where it touched the rock. Some of them had assumed the most fantastic forms from this cause; one exactly resembled a planter's straw hat, and others showed curious constrictions or expansions of the margin.

In some cases one or more small ones were mounted on the back of a larger individual, and there were erosions more or less deep, of a circular form, of the diameter of the rider's foot. This erosion was most extensive around the margin, which was often deeply excavated, while the central portion of the circle was hardly eroded at all. It was probably due to the action of the radula, as faint striæ might be distinguished by means of a glass. In one case the indefatigable mollusk had gnawed through a stratum of shell a quarter of an inch thick on the apex of an old individual, which must have carried the incumbrance about for a long time. The rocks exhibited no erosion.

The species was originally described from the Gulf of California or Lower California, though by some misplacement of labels the habitat was published as Valparaiso, in deep water.

I found a few dead specimens on the same rocky beach. Dr. Cooper and Mr. Rowell have obtained it from the Farallones, Half-Moon Bay, New Year's Point, Santa Barbara and Santa Catalina Islands. I have some small but exactly similar specimens from Cape St. Lucas. Dr. Newcomb obtained this species from Santa Cruz Island.

The number of specimens examined while investigating the anatomy of this species, is thirteen; the number of shells which have passed through my hands is about seventy-five.

GADINIA CARINATA, n. sp. Pl. 4, figs. 12, 13.

Testa rotundata, depresso-conica, tenui, alba, subpellucida; apice lævi, subpostico et oblique marginem dextrum versus resupinato; superne, striis multis minutis versus marginem radiantibus; intus lævi, sulco conspicuo munito, qui extus carinam validem format. Lon. 0·66, lat. 0·60, alt. 0·16 in. Animal incognitum.

Coll. Phil. Acad. Nat. Sciences.

*Hab.* Aspinwall, Central America, Dr. E. Palmer.

The thin depressed shell, fine striæ, smooth and dextrally bent

apex, and the somewhat prominent carina formed by the internal groove, which causes an emargination of the anterior edge, readily distinguish this from the other species of the genus. The lines of growth are impressed and moderately strong.

It is noticable that the apex is dextral, while in *G. excentrica* it appears from the figure to be sinistral. The latter is reported to inhabit corals in deep water, and it is possible that the animal may prove to differ from the true *Gadiniæ*, as living in such situations it can hardly be an air-breather.

GADINIA EXCENTRICA, Tiberi.

*Gadinia excentrica*, Tiberi, Journ. de Conchyl. 1857, p. 37, pl. ii, fig. 6, 6a.

Testa ovalis, oblique conoidea, glaberrima, nitens, striis exilissimis longitudinaliter et transversim decussata; vertex excentricus, posticus, oblique recurvus, infra apicem lateraliter situs. apertura ovalis; margo simplex, acutus. (Tiberi.)

*Hab.* Mediterranean, on the coasts of Sardinia.

This species presents marked points of difference from all other described species of the genus, in its smooth exterior and twisted apex. It is said to be found in the masses of coral brought up by divers in the Mediterranean. The animal is unknown, and needs examination.

This completes the list of species of this genus as far as I have been able to ascertain. They are widely distributed over the world, but appear to be almost entirely confined to the eastern coasts of the two great oceans.

Woodward speaks of the Red Sea as affording a species, but I have not been able to find any description of a *Gadinia* from that locality.

Genus DESLONGCHAMPSIA, McCoy.

*Deslongchampsia*, McCoy, MS. in Morris and Lycett, Mon. Gt. Ool. Moll. p. 94, pl. xii, f. 13, 1850.

*Hemitoma*, Woodw. (non Swains.), Man. Rec. and Foss. Shells (in errata), p. 151, 1851–56.

*Deslongchampsia*, Chenu, Man. de Conchyl., p. 376, f. 2819–20. (Not = *Metoptoma*, Phil., 1836, as Chenu avers.)

D. testa orbiculata, conica; apice subcentrali, versus marginem anticum inflexo; costulis radiantibus, antico sulco lato longitudinali in laminam appendiculatam producto.

Shell suborbicular, conical; apex acute, subcentral, curving

slightly forwards; with a wide longitudinal anterior sulcus, produced into a rounded lobe beyond the margin.

This genus differs from *Gadinia* in the sulcus being straight and longitudinal, instead of directed to the right; in the termination being produced beyond the margin, instead of producing an emargination; in having a mammillated apex and externally conspicuous sulcus, while in *Gadinia* the apex is inconspicuous and the sulcus is usually invisible externally; and finally in having the apex probably directed forward instead of backward, as seems to be the normal state of *Gadinia*.

Its affinities appear to be rather with *Emarginula* than *Gadinia*, and I have appended this notice of it because the synonymy is confused, and Chenu has placed it in the *Gadiniidæ*.

It is certainly not identical with *Hemitoma*, Swainson, with which Woodward unites it, of which the type is *Subemarginula tricostata*, Sby., sp. It also differs essentially from *Metoptoma*, Phil., which Chenu gives as a synonym. The type of *Metoptoma* is the shell figured as "*P. solaris*," Chenu, p. 376, i, fig. 2821, according to Prof. F. B. Meek.

*Type.*

DESLONGCHAMPSIA EUGENEI, McCoy.

*D. Eugenei*, McCoy, MS. Morris and Lycett, Mon. Gt. Ool. Moll. i, p. 94, pl. xii, fig. 13, 13a, 1850. Morris, Cat. Brit. Foss. 1854. Chenu, Man. de Conchyl. i, p. 376, figs. 2819, 2820.

D. testa suborbiculata, conica, apice subcentrali, acuto, sulco antico lato striato; costis numerosis, longitudinalibus, transversisque decussantibus, sulcus interstitialibus profundis. Alt. 3 l., lat. 6 l.

Fossil in the Great Oolite beds of Minchinhampton, found rarely in the white stone of Eastcombs and Bussage.

Chenu's figure gives the idea of a much smoother and more regularly radiated shell than that figured by Morris and Lycett. The regular crenulations of the margin, as figured by Chenu, are not found in the original figure, in which the apex is also much less smooth and mammillated.

DESLONGCHAMPSIA LORICATA, Laube.

*D. loricata*, Laube, Gast. des braunen Jura von Balin; Sitz. Kais. Ak. Wiss. Wien, 1866, p. 82 (name only). Stoliczka, Pal. Indica, Vol. II, p. 324.

This species is catalogued by name without description or

figure, but accompanied by the remark that "it differs from *D. appendiculata* by its greater elevation and reticulated exterior, and from *D. Eugenei* by its more elevated form and alternating stronger and weaker striæ" (Laube, loc. cit.) The discrepancies between the figures of Chenu and Morris have been already alluded to; in default of a figure, the author might at least have afforded an intelligible description; at present the species can hardly be said to have been established. It is merely referred to by name by Stoliczka.

DESLONGCHAMPSIA APPENDICULATA, Desl.

*Patella appendiculata*, Desl., Mem. Soc. Linn. de Norm. vii, pl. xi, figs. 1, 2.

*Deslongchampsia appendiculata*, M. and L., Mon. Gt. Oolite Moll. p. 94, vol. i.

D. testa subovata; costis simplicis, grandis, radiantibus.

Shell suboval, with large simple radiating costæ.

According to Prof. McCoy, the genus was first recognized, but not described, by M. Deslongchamps, who had only seen this species.

There are a number of fossils which bear a strong resemblance to this genus and to *Gadinia*, but they are usually described as *Patella*, and the external surface, only, figured, so that it is impossible to decide on their affinities.

I have in each case, when practicable, copied the author's original description.

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## REFERENCES TO PLATE 2.

*Gadinia reticulata*, Sby., Monterey, Cal.

Fig. 1. Soft parts from above. *a*, anus. *b*, opening of the pulmonary cavity. *c*, vaginal papilla. *d*, foramen of penis. *m*, buccal mass, showing the two nervous ganglia, the œsophagus, the adductors and retractor muscles, and the position of the radula. *h*, heart. *f*, papilla of the lung. *o*, ovary. *l*, liver, indicated by the darker shade. *a*, *m*, muscles of attachment to the shell. *i*, lung. *r*, renal organ.

Fig. 2. Ganglia. *d*, dorsal. *v*, ventral.

Fig. 3. Foot stripped of all appendages, showing the mode of growth of the muscles.

Fig. 4. *a*, central and six lateral teeth of the radula as in situ. *d*, 6th lateral. *h*, 24th lateral. *f*, abnormal 25th lateral. *b*, 75th lateral. *c*, 80th lateral. *g*, 100th lateral. *e*, extreme outer laterals.

Fig. 5. Muscular impressions on the shell, nat. size. *a*, cicatrix of the mantle. *b*, *b*, horse-shoe-shaped muscle cicatrix. *d*, sinus. (Drawn as if seen from above.)

Fig. 6. Animal, nat. size, as moving.

Fig. 7. *a*, anterior rhachidian teeth. *b*, the same near the middle of the radula. *c*, side figure of 6th lateral. *d*, do. of 75th lateral.

Fig. 8. Section of the rectum.

Fig. 9. Side view of alimentary canal.

## References to Plate 4.

Fig. 1. Side view of normal specimen of *G. reticulata*, Sby.

Fig. 2. Same from below.

Fig. 3. Curious variety of the same.

Fig. 12. *Gadinia carinata*, Dall, from above, nat. size.

Fig. 13. Same from below.

## DESCRIPTIONS OF NEW SPECIES OF MARINE BIVALVE MOLLUSCA IN THE COLLECTION OF THE ACADEMY OF NATURAL SCIENCES.—No. 2.

BY GEO. W. TRYON, JR.

7. Macha Wilsonii, Tryon.—Plate 1, fig. 2.

*Description.*—Shell oval-oblong convex, anteriorly broadly obliquely rounded, posteriorly truncately rounded, white under a light corneous epidermis, with rugose growth-striæ, and with raised oblique irregularly curved lines extending from the posterior dorsal margin towards the central part of the ventral margin, most of them abruptly angled before reaching the margin, and thence ascending again obliquely towards the anterior dorsal margin. Umbones not very prominent, situated at a little more than one-third the total length from the anterior end. Dorsal margin a little incurved and descending posteriorly. Ventral margin also slightly incurved in the middle. Within glossy white.

*Dimensions.*—Width 3·25. Length 1·50 inches.

*Hab.*—China.

*Observations.*—This is a common species, frequently met with in boxes of Chinese shells, yet strangely overlooked by the conchologists. In form and sculpture it resembles the Mediterranean *M. strigillatus*, but it is larger, more solid and white. Named in compliment to the late Dr. Thomas B. Wilson, a gentleman who took great interest in conchology, and to whose liberality the Museum of the Academy of Natural Sciences is largely indebted.

8. Donax (*Serrula*) pictus, Tryon.—Plate 1, fig. 1.

*Description.*—Shell convex, obtusely wedge-shaped, broadly truncate behind, anteriorly rounded; posterior angle prominent but rounded; ventrally somewhat arcuated; umbones prominent;

surface covered with flat ribs, separated by narrow, shallow sulci. White, with brownish, longitudinal, pencilled rays. Teeth white, prominent; interior surface white and polished; margin strongly denticulated; the interstices between the denticulations, on the posterior margin dark brown.

*Dimensions.*—Length 19, width 28 mill.

*Hab.*—?

*Observations.*—I cannot approximate this species to any hitherto published. It seems peculiar in its strong denticulations and color. The only specimen which I have seen is in the Academy's collection. It is somewhat worn, but when fresh, the species must be beautiful in appearance.

9. Tellina (*Peronæa*) Conradi, Tryon.—Plate 1, fig. 5.

*Description.*—Ovate, somewhat inequilateral, rounded in front, obtusely wedge-shaped and flexuose behind; one valve convex, smooth, polished; the other not so convex, crowded with oblique fine lines; dorsal margins somewhat convex, sloping; ventral margin convex before, slightly concave behind. Rose color inside and outside.

*Dimensions.*—Length 16, width 25 mill.

*Hab.*—?

*Observations.*—This species has been hitherto confounded with *T. dispar*, Conrad. It differs from that species in color and in form, being more produced and flexuose posteriorly. Sowerby's figures, 113, 114 (Thes. Conch. i.), included by him in *dispar*, represent this species.

10. Strigilla producta, Tryon.—Plate 1, fig. 4.

*Description.*—Shell solid, subglobose, anteriorly rounded, posteriorly produced, obliquely finely striated, glossy white, centrally covered with a large, rose-colored spot outside and inside.

*Dimensions.*—Length 6·5, width 8 mill.

*Hab.*—Ins. Jamaica.

*Observations.*—This species has been confounded hitherto with the common West Indian form, *S. pisiformis*, which it strongly resembles, but may be readily distinguished by its much more produced posterior side.

## NOTE ON CYCLOPHORUS FOLIACEUS, REEVE (NON CHEMNITZ), AND C. LEAI, TRYON.

BY GEO. W. TRYON, JR.

When I wrote the description of *?Cyclostoma Leai*, published in this journal (V. part 2), Reeve's Monograph of *Cyclophorus* was not accessible to me. I now find that my species is figured in the Iconica (figure 52) as *Cyclophorus foliaceus*, Chemnitz, and the Andaman Islands assigned as locality. Mr. Reeve remarks: "It was admirably figured between seventy and eighty years ago by Chemnitz, but the figures of the Conchylien Cabinet have been regarded as representing worn specimens of the well-known *Otopoma Naticoides*, from Socotra, which has a shelly operculum. Dr. Pfeiffer separated it from that species in 1846, in his Monograph of Cyclostoma, in Küster's edition of the 'Conchylien Cabinet;' but in his subsequent monographs he abandoned that view, and quoted it as a synonym of *O. Naticoides*. Mr. Benson's discovery, confirming the original species of Chemnitz, was made known in the 'Annals and Magazine of Natural History' for February, 1860, and January, 1861. It will be seen that Mr. Benson's specimens are smaller than that figured by Chemnitz, but he thinks it probable that larger specimens may be found when the exploration of the main island of the group can be safely attempted. The varicose repetition of the lip appears to be a constant character of the species."

In 1865 Pfeiffer published a second supplement to his monograph, and therein changes his views of the species in question, adopting the opinions of Messrs. Benson and Reeve.

Neither of my specimens contained an operculum, so that, to me, their generic position was doubtful; but those submitted to Mr. Benson contained horny opercula, and thus he has placed the species in *Cyclophorus*.

That Reeve's shell figured is the same as mine, I do not doubt; but it is certainly different from the species figured by Chemnitz. The latter is much larger, and the foliations are continued across

the shell for nearly an entire volution. I think it entirely probable that Chemnitz's species *is* from the Andaman Islands, as it is in many respects closely allied to mine. Until we shall receive more evidence on the subject, I think my species ought to stand, the synonymy to be as follows:

CYCLOPHORUS LEAI, Tryon, 1869.

*Cyclophorus foliaceus* of Reeve and Benson (non Chemnitz), 1860–61.

The pattern of the epiphragm is unknown to the English naturalists.

## CATALOGUE OF THE SHELL-BEARING MOLLUSCA OF FULTON COUNTY, ILLINOIS.

BY JOHN WOLF.

SUCCINEA, Drapernaud.

S. obliqua, *Say.*
" vermeta, "
" avara, "
" Grosvenorii, *Lea.*
" Wardiana, "
" Mooresiana, "
" Nuttalliana, "

MACROCYCLUS, Beck.

M. concava, *Say.*

HYALINA, Ferussac.

H. indentata, *Say.*
" arborea, "
" electrina, *Gld.*

CONULUS, Fitzinger.

C. chersina, *Say.*

STROBILA, Morse.

S. labyrinthica, *Say.*

ANGUISPIRA, Morse.

A. solitaria, *Say.*
" alternata, "

PATULA, Held.

P. perspectiva, *Say.*
" striatella, *Anth.*

HELICODISCUS, Morse.

H. lineata, *Say.*

PSEUDOHYALINA, Morse.

P. minuscula, *Binney.*

VALLONIA, Risso.

V. minuta, *Say.*

ULOSTOMA, Albers.

U. profunda, *Say.*

MESODON, Rafinesque.

M. thyroides, *Say.*
" clausa, "
" Pennsylvanica, *Green.*
" multilineata, *Say.*
" var. unicolor, "

STENOTREMA, Rafinesque.

S. lineata, *Say.*
" monodon, *var.* fraterna, *Say.*
" " " Leaii, *Ward.*

LEUCOCHILA.

L. armifera, *Say.*
" pentodon, "
" contracta, "

PUPILLA, Leach.

P. fallax, *Leach.*
" corticaria, *Leach.*
" rupicola, "

VERTIGO.

V. ovata, *Say.*
" milium, *Gld.*

V. simplex, *Gld.*
" tridentata, *Wolf.*

CARYCHIUM, Say.

C. exiguum.

LYMNÆA, Lamarck.

L. umbrosa, *Say.*
" reflexa, "
" caperata, "
" desidiosa, "
" humilis, "
" exigua, *Lea.*
" curta, "
" parva, "

PHYSA, Drapernaud.

P. gyrina, *Say.*
" hypnorum, *Drapernaud.*
" Hildrethiana, *Lea.*

HELISOMA, Swainson.

H. trivolvis, *Say.*
" bicarinatus, *Say.*

MENETUS, H. and A. Adams.

M. exacutus, *Say.*

GYRAULUS, Agassiz.

G. deflectus, *Say.*
" parvus, "

PLANORBULA, Hald.

P. armigera, *Say.*

ANCYLUS, Geoffrey.

A. tardus, *Say.*

VALVATA, O. F. Müller.

V. tricarinata, *Say.*

MELANTHO, Bowditch.

M. subsolida, *Anth.*
" rufa, *Hald.*
" exilis, *Lea.*

VIVIPARA, Mont.

V. intertexta, *Say.*
" subpurpurea, *Say.*
" contectoides, *Binney.*

SOMATOGYRUS, Gill.

S. isogona, *Say.*

AMNICOLA, Gld. and Hald.

A. decisa, *Hald.*
" limosa, *Say.*
" porata, *Say.*
" Cincinnatiensis, *Anth.*

BYTHINELLA, Leach.

B. obtusa, *Lea.*

POMATIOPSIS, Tryon.

P. Cincinnatiensis, *Lea.*
" lapidaria, *Say.*

PLEUROCERA, Rafinesque.

P. subulare, *Lea.*
" Lewisii, "

GONIOBASIS, Lea.

G. gracilior, *Anth.*
" livescens, *Menke.*

SPHÆRIUM, Scopoli.

S. solidulum, *Prime.*
" triangulare, *Say.*
" transversum, "
" sphæricum, *Anth.*
" rosaceum, *Prime.*
" occidentale, "

PISIDIUM, Pfeiffer.

P. abditum, *Hald.*
" variabile, *Prime.*

## UNIONIDÆ.

UNIO, Brug.

U. multiplicatus, *Lea.*
" pustulatus, "
" pustulosus, "

U. ellipsis, *Lea.*
" elegans, "
" ebenus, "
" securis, "
" spatulatus, "
" donaciformis, "
" iris, "
" zig-zag, "
" anodontoides, "
" tenuissimus, "
" trigonus, "
" tuberculatus, "
" Dorfeuillianus, "
" occidens, "
" coccineus, "
" rubiginosus, "
" solidus, "
" asperrimus, "
" lævissimus, "
" Cooperianus, "
" inflatus, "
" neglectus, "
" monodontus, *Say.*
" alatus, "
" undulatus, *Barnes.*
" gibbosus, "
" ligamentinus, *Lam.*
" gracilis, *Barnes.*

U. cornutus, *Barnes.*
" triangularis, "
" parvus, "
" fragosus, *Conrad.*
" luteolus, *Lam.*
" crassidens, *Lam.*
" rectus, "
" capax, *Green.*
" metanever, *Raf.*
" orbiculatus, *Hild.*
" Æsopus, *Green.*
" plicatus, *Leseur.*

MARGARITANA, Schum.

M. confragosa, *Lea.*
" complanata, "
" rugosa, "
" marginata, "
" deltoidea, "

ANODONTA, Lam.

A. corpulenta, *Cooper.*
" grandis, *Say.*
" ovata, *Lea.*
" subcarinata, *Currier.*
" suborbiculata, *Say.*
" imbecillis, "
" edentula, *Lea.*

## REMARKS ON THE ANATOMY OF THE GENUS SIPHONARIA, WITH A DESCRIPTION OF A NEW SPECIES.

BY WM. H. DALL, SMITHSONIAN INSTITUTION.

The genus *Siphonaria*, described by Sowerby in 1824, is one of the most natural and homogeneous instituted at that early day. It comprises some ninety species, principally from the tropics, but has representatives in most parts of the temperate zone. Probably the most northern species yet described is one mentioned in this paper—*S. thersites*, Cpr., from Sitka and the coast of Alaska in lat. 57° N.

If a conchologist were to take a specimen of this species in one hand and in the other a specimen of *S. gigas*, Sby., from Panama, he would hardly be inclined, however, to place both of them in the same group. One is smooth, horny and minute, with the apex subterminal, and the siphon rib very large; and the other is very large, solid and heavy, with the apex central, and no outward indication of the siphon. Between these forms, however, we find gradations; yet the genus, from the shells alone, may be separated into two natural groups, perhaps of subgeneric value, of which one contains the greater proportion of the species. The dentition of a species of *Siphonaria* (specific name not given) is figured by Woodward in his manual, and has been copied by all subsequent authors, or described (as by H. and A. Adams) as representing the dentition of the genus. The species is from the Cape of Good Hope, and from that locality all the described species belong to the *S. sipho* group. I have not been able to obtain the soft parts of more than one of the species of that group, to confirm Woodward's figure.

The examination of several species of the group typified by *S. thersites*, shows a decided difference in the dentition.

The following is suggested as an arrangement of the family:

## Family SIPHONARIIDÆ.

Syn. *Siphonariadæ*, Gray, Syn. Brit. Mus. 1840. Mrs. Gray's Moll. vol. iv, p. 181, 1859. Cpr. Maz. Shells, p. 181, 1856.

*Siphonaridæ*, D'Orb., Voy. Amer. Meridionale, 1841.

*Siphonariidæ*, H. and A. Adams, Vol. ii, p. 270. Gen. Rec. Moll., Nov., 1855. Binney, L. and F. W. Sh. of N. Amer. ii, 152. Chenu. Man., vol. i, p. 485, 1859.

### Genus SIPHONARIA, Sby.

Syn. *Siphonaria*, Sby., Genera of shells, part xxi, 1824. Proc. Zool. Soc., 1835, p. 6. Blainville, Dict. Sci. Nat. vol. xxxii, p. 267, 1825. Rang, Man. des. Moll. p. 141, 1829. H. and A. Adams (as of Blainv.) Gen. Rec. Moll. vol. ii, p. 270. Woodw. Rec. and Foss. Shells, pp. 155 and 174. Hanley P. Z. S., 1858.

*Muretia*, D'Orb., (as of Sby.) Voy. Amer. Meridion. p. 682, 1841.

*Trimusculus*, Schmidt., MSS., 1832. Isis, p. 132.

*Liria*, Gray, MSS. Phil. Mag., 1824.

*Lepas* sp. (*Le Mouret*) Adans., Coq. du Senegal, p. 34, 1757.

*Patella* sp. various authors.

*Nacella*, sp., Cpr.

Type *Siphonaria sipho*, Sby. China, Japan.

The genus may be divided into two natural sections, as follows:

#### A. (*Siphonaria.*)

Shell solid, porcellanous; apex central or sub-central; provided with more or less elevated radiating ribs or ridges, which by their projection render the margin irregular. In many of the species the siphonal groove is produced internally beyond, or passes around, the apex on the left side. In Quoy's figure of *S. diemenensis* the gill is represented as passing before the heart. The inner lateral teeth have a broad, somewhat oblique, cusp, emarginate at the tip. (The outer laterals are also described as similar by Woodward, but this does not agree with my observations.) The outer laterals are broad and tridentate. The central tooth is slender with a lozenge-shaped cusp. The jaw is simple and arcuated. This section of the genus is best typified by *S. gigas*, Sby., and *S. sipho*, Sby. Most of the species are tropical.

B. (*Liriola.*)

Shell thin, horny; smooth, or furnished with fine radiating lines, which do not interrupt the margin. Apex marginal or submarginal, twisted to the left of the median line in most of the species. The gill passes behind the heart and lung. The jaw is simple and arcuate. The rhachidian tooth is moderate, with a simple pointed cusp. The inner laterals are long, narrow and strongly bidentate. The outer laterals are broad and tridentate with short cusps.

This section is typified by *S. thersites*, Cpr., and would include *S. lateralis*, Gld., *S. redemiculum*, Rve., *S. Macgillivrayi*, Rve., *S. Lessoni*, Blainv., and all the similar species, such as *S. tristensis*, *S. lineolata* and others from the South American coast. The species are more numerous in the temperate zone, though not confined to it.

If it be considered desirable to give a name to this group, *Liriola* might be used in a restricted sense to indicate it.

The following species belongs to the first section :

SIPHONARIA ALTERNATA, Say.

*Patella alternata*, Say, Journ. Phil. Acad. Sci. vol. v, p. 215, Feb., 1826.

*Siphonaria alternata*, Say, Am. Conch. part iv, pl. 38, 1832. Binney's Say's Works, pp. 124, 192, pl. 38. Binney L. and F. W. Shells of N. Am. part ii, p. 153, fig. 254. Chenu, 50, pl. xiii, fig. 3.

Shell conical, with more or less elevated, unequal ribs, thirty or more in number. Apex subcentral, recurved obliquely, the tip pointing in a nearly parallel direction with the longitudinal axis of the shell, and acute. Color brown, radiated with white; base oval. Length three-tenths of an inch.

Say's figure of this species in Binney's reprint is represented as with too few ribs and too smooth interspaces. The wood-cut copy in the L. and F. W. Shells of N. A. is also very poor.

The external appearance of the animal is much like the next species. The mantle edge is brown, thick and somewhat corrugated. The remainder is livid slate color. The lobe which closes the pulmonary opening is large and thin, gray and edged with brown. There were no eyes visible, yet they probably exist and are very minute. The anatomy resembles that of the next species, except that the penis is larger in proportion to the size of the animal.

The jaw is simple and arcuated. The central tooth is very slender; the cusp has a simple point. The inner laterals have a

broad emarginated cusp nearly twice as long as the base. The laterals grow broader and shorter toward the edge. The outer thirteen laterals are tridentate. The inner laterals from the eleventh to fifteenth are bidentate. The formula is 39·1·39 or 15·15·1·15·15. There are about two hundred rows in all.

The following species belong to the second section :

Siphonaria thersites, Cpr., Annals and Mag. Nat. Hist., 1864, xiv, p. 425.

Cpr. (MSS.) Suppl. Rep. to the Brit. As., 1863, pp. 627 and 676. Stearns, shells of Alaska, Pr. Cal. Ac. Sci. Vol. III, p. 334.

Testa parva, tenui, haud elevata, valde inequilaterali, dense nigro-castanea, lævi seu interdum costulis paucis, obtusis, obsoletis, radiatim vix ornata; epidermide lævi, tenui, fugaci; costa pulmonali intus et extus valde conspicua, tumente: vertice obtuso, plerumque ad quadrantem, interdum ad trientem totius longitudinis sito; intus intense nigro-fusco, margine acuto. Lon. ·46, Lat. ·33, Alt. ·17 in.

*Hab.* Neeah Bay; Sitka; Vancouver's Island; Fort Simpson; N. W. C. Am.

The external appearance of the animal is very plain. The mantle edge, sides of the foot, and head are smooth and even. The lobe is stout and short. The head is small, and the eyes could not be found with a high power. The soft parts are entirely contained within the shell. The color in spirits was a dusky slate-color.

The jaw is simple, arcuated and rounded at the ends. The rhachidian tooth is slender with a simple pointed cusp.

The inner nine laterals are provided with an oblique, equibidentate cusp. The tenth, eleventh and twelfth are tridentate. The remainder are much broader and shorter, tridentate; the central point more prominent than the others, and, in the thirteenth, fourteenth and fifteenth slightly emarginate at the tip. The cusps grow less conspicuous toward the outer edge, and in the outer three teeth are hardly perceptible. The formula is, 22·1·22, or 7·3·3·9·1·9·3·3·7.

This species having been obtained in lat. 57° N., is probably the most northern representative of the genus.

Siphonaria Tristensis, Sby.

*S. Tristensis*, Sby., Genera of Shells, fig. 3. Rve. Mon. *Siphonaria*, Pl. V, fig. 23a, b.

*Patella Tristensis*, Leach, teste Rve.

*Siphonaria Lessoni*, Blainv., teste Rve.

S. testa ovato-conica, tenuicula, vertice sub-oblique acuminato et intorto ; sordide virescente, lineis fuscis irregulariter radiatim filosa, intus nitente castanea.

*Hab.* Tristan d'Acunha, Rve. (in error.) Orange Harbor, Tierra del Fuego. U. S. Exploring Expedition.

*External Appearance.* The epidermis on the head and sides of the foot is granulose, rough to the touch. The mantle edge is simple, slightly tuberculose and continuous over the head and lobe. The colors, as far as could be judged from the alcoholic specimens, had been purplish. The edge of the mantle was distinctly marked by well defined stripes of dark brown or blackish, and white ; corresponding to the riblets and dark intervals of the shell. The head or muzzle is rounded, with the corners somewhat produced or triangular. The sides of the foot are broad, and the sole is smaller in proportion to the aperture of the shell than in most patelliform shells. The lobe beneath the pulmonary opening is triangular and large. It is pierced for the anus. On the neck behind the head is a small papilla, indicating the foramen of the genitalia. It is on the right side. The end of the muzzle is flattened, and the mouth is not conspicuous.

*Alimentary System.* The buccal mass is proportionately small, and not as muscular as in most pulmonates. The œsophagus leaves it from the middle of the superior surface, and at the posterior end of the buccal body is constricted and bound down by a collar of nerves and muscular fibres. A small elongated salivary gland lies on the upper surface of the buccal mass, on each side of the œsophagus, and empties into it by the posterior termination of the gland. Behind the collar the alimentary canal is broadly dilated, forming a sort of crop. This is slightly constricted, and behind the constriction is the true stomach. This is rhomboidal in shape. The intestine leaves the stomach at its anterior end, on the left side, and is reflected over the latter in a broad loop to the right, when it turns again, and passing around the posterior end of the body opens through the lobe, which closes the pulmonary orifice. Some small muscular fibres bind the posterior end of the stomach to the foot.

The jaw is horny and dark brown. The cutting edge is smooth and arcuated. The portion which is inserted into the flesh is striated and produced into long, stout, muscular filaments, which are not represented in the figure. There are two well marked notches on the superior edge. The jaw is deeply grooved behind and the inner surface striated.

The radula is stout and of a dark brown color.

The formula is 50·1·50 or 20·30·1·30·20.

The rhachidian tooth is broad, rounded before, and with the base arcuate behind. The cusp is simple, rounded before, and more or less pointed behind. In some individuals this point is more prolonged than in others, and in such cases the tip is transparent, while the rest of the cusp is yellowish. The inner twenty-seven laterals have a longitudinally arcuated rhomboidal base, of which the anterior edge is produced before the cusp. The latter is long, with one prominent long denticle, and one short and triangular on the inner side. The tips of these denticles are more or less transparent, while the body of the cusp is yellow, and the thick base showing through is liable to mislead the observer, as to the form of the cusp. The twenty-eighth lateral is similar but broader, with a shorter denticle, more or less bifid or arcuate at the tip, and the cusp is broadly rounded on the outer side. The twenty-ninth has the prominent denticle emarginate, broad and rounded, and has a third denticle on the outer side. The emargination of the chief denticle is more obvious in young specimens, and in old ones is not always noticeable, except in a smaller number of the laterals. The laterals gradually increase in width and decrease in length toward the edge of the radula, and in the extreme outer teeth have the three denticles rounded, sub-equal, and the base more than twice as wide as it is long.

The cusps of the inner laterals are, to a certain extent, bayonet-shaped, as will be seen by the figure. There are about two hundred and fifty rows.

*Muscular System.* There are no internal bands of muscular fibre as in *Melampus* or *Gadinia*. The muscles which control the buccal mass are not strongly developed. The muscles of the *preputium* are spirally arranged in two layers.

The adductor is divided into three parts. On the right a broad passage exists where the opening of the pulmonary cavity lies. The small portion of the right limb of the adductor, anterior to this, is rounded-triangular. The mantle is attached to the shell, over the head, so that the scar is continuous. The right extremity of the posterior part of the adductor is broadly rounded. On the left the scar appears continuous, but the anterior and posterior parts, though approximate, are separated by a suture, showing a tendency to bilateral symmetry. The left anterior portion closely approaches the buccal mass.

The foot is moderately thick and muscular, and divided by a very faint median line in its internal muscular structure. The nerves and blood vessels mostly enter the foot in this line.

*Circulatory System.* The heart is enclosed in a sac, of which

the longitudinal diameter is parallel with the axis of the body. This sac is situated on the left side, between the lung and the renal organ. Several large vessels traverse the lung, and one crosses it, and follows the median line of the gill. The smaller vessels could not be traced, as the specimens had been many years in spirits and were extremely rigid.

*Respiratory System.* The lung resembles that of *Auricula*, but is less developed than in that genus. It is rounded triangular, and terminates in a multifid papilla, through which the renal organ also discharges its secretions by a special duct.

The branchiæ are simply triangular folds of the lining membrane of the mantle, somewhat attached to each other by a raphe, in the line of which the principal vein passes. These folds are more or less numerous in different individuals, apparently more conspicuous in the older specimens, but by no means constant.

Some authors have considered the lungs of mollusca as invaginated gills. The present instance does not bear out the homology. The gills are simple modifications of the mantle lining, while the lung is a special organ, which serves a specified purpose, and none other, and does not involve the mantle lining, except as one of the membranes between which the lung is situated.

*Reproductive System.*—The genitalia have a common opening into a small papilla on the right side of the neck, behind the head. The penis is very large and stout. It is contained in a *preputium*, consisting of two spirally coiled muscular layers. These are continued in a kind of sac, which is reflexed anteriorly, and contains the testicle. The latter is very small and easily overlooked, and the prostate is also inconspicuous.

The ovary is large and kidney shaped. It is really doubled up upon itself. There is a small spiral mucus gland at the posterior extremity, but the duct of this gland is very long, and only enters the oviduct beyond the ovary. The latter leaves the ovary with a double flexure, and is prolonged as a simple, slender tube entering the rounded-triangular uterus by the left posterior angle. The genital bladder enters on the other side by a short, stout tube. The former is rounded and transversely ovate. The uterus is large and somewhat produced at the posterior corners. The vagina, if we may term it so, is moderately large, and opens into the genital papilla before mentioned. The latter is very small in young examples.

*Nervous System.*—This principally consists of a stout, nervous collar, of ganglia united by nerve fibres, encircling the œsophagus just behind the buccal mass. More numerous fibres are given out below than above. One of the former connects with a small accessory ganglion near the ovary.

*Other organs.*—The eyes in this species are exceedingly minute, so as to be invisible to the naked eye unless well trained. They are circular and deep seated. In alcoholic specimens the skin must be carefully shaved away and examined by transmitted light in order to find them at all. They can be of little real use to the mollusk, as vision must be out of the question, and they can hardly be more than sensible to light and darkness. No organs of hearing were detected.

This dissection does not agree with the figures of Quoy (*S. Diemenensis*), which, as is the case with many of Quoy's figures, seem to owe a good deal to the imagination of the artist. I am inclined to refer the differences, especially those of the genitalia, rather to this cause than to any real differences of structure between the species.

SIPHONARIA PELTOIDES, Dall ex Cpr. Plate 4, fig. 11, a, b.

*Nacella peltoides*, Cpr., Ann. and Mag. Nat. Hist. 1864, i, p. 474, No. 15. Sup. Rep. Br. Ass. 1863, pp. 418 and 545.

*Nacella*, sp. indet., Cpr., Maz. Cat. No. 262, p. 202. Rep. Br. Assoc. 1856, p. 252.

*Nacella* (*?*) *subspiralis*, Cpr., Proc. Cal. Acad. Sci. iii, p. 213, 1866. Sup. Rep. Br. Assoc. 1863, p. 612, No. 65; p. 650, No. 240 (name only). Coop. Geogr. Cat. Cal. Moll. p. 23, No. 443, 1867.

*Nacella ? vernalis*, Dall, MSS. 1866. Stearns, Shells of Purissima and Lobitas, Proc. Cal. Ac. Sci. Vol. iii. p. 345, 1867. Hepburn's Shells, do., p. 284. Shells of Santa Barbara, do., p. 344.

S. testa tenuissima, conica, parva; vertice subacuto, subpostico; lævi seu interdum costulis paucis, obsoletis radiatim vix ornata; epidermide tenui subfusco seu viridi clari, non lævi, fugaci; costa pulmonali intus et extus valde inconspicua; testa, extus subfusco cum luteo-virido radiatim; intus lævissime. Lon. ·48, Lat. ·36, Alt. 23 in.

*Habitat*, Monterey, Purissima, Lobitas, Santa Barbara and San Diego, California. Gallapagos Islands, Dr. Hable. Mazatlan (Reigen coll.), Cpr. Cape St. Lucas, Xantus. Catalina Id., Cooper, 6—10 fms., dead.

Shell small, thin, conical; apex recurved, nearly in the median line, more or less acutely pointed; generally somewhat eroded in old specimens. Epidermis thin, not polished, smooth, brownish red on the apex and in dead shells; in fresh or young individuals of a bright grass green, somewhat wrinkled and frequently overlapping the border of the shell; fugacious. Shell smooth, reddish brown, with fifteen or more light yellow green

rays of color, radiating from the spire. There are no ribs or costæ, but occasionally a moderately sharp line or two may be observed radiating from the apex, and impressed, as it were, from below. The apex is lighter than the rest of the shell. The interior is extremely polished and brilliant, and only in dead specimens is the mark of the siphon perceptible without a glass. The external colors are visible within, from the translucency of the shell. The siphonal groove is not visible from the outside, nor does it cause any extension or emargination of the edge of the shell. The aperture is roundly oval and the edge simple.

Some thirty specimens of this beautiful little species were found dead on the Halfmoon beach at Monterey. One was found adhering to the frond of a *Laminaria*. Dr. Newcomb obtained it at Santa Barbara; Mr. Hepburn at San Diego; Mr. Stearns at Purissima and Lobitas, San Mateo county, Cal. Among a large number of beach shells obtained on the Gallapagos Islands by Dr. Hable, this species was not uncommon; the specimens were generally thinner, lighter colored, and smaller than those obtained from further North. When this shell was first obtained at Monterey, in a hurried list of species found by me at that locality, I gave it the MSS. name of *vernalis*, from the bright green epidermis, and referred it doubtfully to the genus *Nacella*, which it externally resembles. Being called away by other duties to a more northern station, the MSS. and specimens were referred to Dr. Carpenter. At first that gentleman was disposed to refer the shell to a lost species described by Middendorf under the name of *Acmæa pileolus*. As the shell in question has not been found north of San Francisco, it is not probable that Middendorf ever saw it, and, moreover, I am informed that his type specimens do not agree with his diagnosis, and are probably young *Acmæas*, while his figures differ from this species.

Dr. Carpenter called my attention to the mark of the siphon, and a more thorough examination showed that it belonged to the genus *Siphonaria*.

A careful examination of the type specimens in the Smithsonian Cabinet has developed the following unexpected coincidences:

*Nacella peltoides*, Cpr. (S. I. Cat. No. 4023) is exceedingly minute, but appears to be identical with this species. The type is so young that it is almost colorless, but the mark of the siphon is perceptible with a magnifier. It is a pity that so inelegant a name must be applied to this pretty species.*

*? Nacella subspiralis*, Cpr. (S. I. Cat. No. 11,847). A careful

* The nuclear whorls, usually broken off, are preserved in the unique type of *subspiralis*, and in the types of *peltoides*. I also found them on a very few specimens from Mty. and Gal. Ids.

study of the type convinces me that it differs from normal adult specimens of *peltoides* only in being abnormally elevated, dead and faded. The siphon mark is evident under a glass. The epidermis is gone; and the margin is irregular, showing that its station must have been unfavorable to lateral expansion, hence the unusually elevated and conical form.

The animal has not, as yet, been observed. For a littoral species it has an extraordinary range; from Monterey to the Gallapagos Islands, and its discovery at the latter point by Dr. Hable is extremely interesting. The only other species known from Monterey and the Gallapagos are *Semele rupium*, Sby.; (?)*Modiola capax*, Conrad; (?)*Bulla Quoyi*, Gray; and (?)*Purpura triangularis*, Blainv. The three latter are doubtful. Two other species of *Siphonaria* [*S. gigas* and *S. scutellum(?)*] are reported from the Gallapagos. (The locality of *S. scutellum* is given by Reeve as New Zealand.)

The following species are known on the West Coast, north of Panama:

*Siphonaria gigas*, Sby., Equador to Gulf of California.
*S. lecanium*, Phil., " " "
*S. characteristica*, Reeve (?–*gigas var.*), Gallapagos and Panama.
*S. peltoides*, Dall ex Cpr., Gallapagos to Monterey.
*S. scutellum*, Blainv., Gallapagos.
*S. maura*, Sby., Panama.
*S. pica*, Sby., Panama and Cent. Am.
*S. costata*, Sby., " "
*S. æquilirata* (Reeve), Cpr., Gulf of California.
*S.* (? var.) *palmata*, Cpr., Mazatlan.
*S. thersites*, Cpr., Puget Sound to Sitka.

There are probably several other species on the coast and Gulf of California, which I cannot determine from the material at hand. There are also one or two species in Japan, which may be found on some of the Aleutian Islands.

### ANISOMYON, Meek, 1860.

*Anisomyon*, Meek and Hayden, Amer. Journ. Sci. and Art, xxix (2d series), p. 33, pl. 1 (*A. patelliformis*), Jan., 1860.

Type *A. borealis*, Morton sp. (as *Hipponyx.*)

This genus was constituted for several rounded, thin, sparsely striated, cretaceous, patelliform shells, which have the muscular impression interrupted on the right side, and the apex, when perfect, subspiral or reflected. They appear to form a passage

toward *Gadinia* in their rounded form, but are more closely allied to the *Siphonariidæ*. They cannot be affiliated to the *Patellidæ* or *Tecturidæ*. The following species were enumerated in the paper alluded to, as having been definitely identified as belonging to this genus: *A. borealis*, Morton; *A. sexsuleatus*, *alveolus*, *patelliformis*, and *subovatus*, all of Meek and Hayden.

The student who desires to pursue the subject further, will do well to consult the Conchologia Iconica and the list of species of *Siphonaria* given by Hanley in the Proc. of the Zool. Society of London, 1858, page 151.

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## References to Plate 4.

Fig. 8. a, side view of *Siph. thersites*, with the shell removed.
b, view of same in the shell, from below.

Fig. 9. Nervous system of *Siphonaria Tristensis*, Sby.

Fig. 10. Dentition of *Siphonaria* (*Siphonaria*) *alternata*, Say.
b, Rhachidian tooth.
a, section of 17th lateral.

Fig. 11. *Siphonaria* (*Liriola*) *peltoides*, Dall ex Cpr.
a, from above, enlarged one-fourth.
b, side view.

## Explanation of Plate 5.

Fig. 1. Dentition of *Siphonaria* (*Liriola*) *tristensis*, Sby.
1″ a, side view of 45th tooth.
1″ c, " " " 1st lateral 1″ b, section of do.

Fig. 2. Dentition of *Siphonaria* (*Liriola*) *thersites*, Cpr.
1′ a, side view of 1st lateral.

Fig. 3. Digestive and generative organs of *Siphonaria tristensis*, Sby. From above.

a, anus.
b, genital bladder.
c, crop.
g, genital papilla.
m, buccal mass.
o, ovary,
r, rectum.
st, stomach.
j, jaw.
l, l, l, boundary of liver.
l, a, left adductor muscle.
r, a, right " "
p, a, posterior adductor.
p, penis.
s, salivary gland.
t, testis.

Fig. 4. Jaw of *S. tristensis*.

a, anterior view. b, posterior view.

Fig. 5. Jaw of *S. thersites* from in front.

Fig. 6. *Siphonaria tristensis* from below, in the shell.

Fig. 7. The same from above with the shell removed and the mantle turned back.

m, attachment of the mantle to the shell.
r, renal organ.
h, cardial sac cut open to show the heart.
p, pulmonary papilla and lung traversed by blood vessels.
b, branchia.
The dotted line indicates the course of the rectum.

## NOTES ON MOLLUSCA OF MONTEREY BAY, CALIFORNIA.

BY J. G. COOPER, M. D.

Monterey is situated in lat. 36° 36′, on nearly the same parallel as Norfolk, Va., Cadiz, Spain, and the northern part of Niphon, Japan, and has of late become quite noted among those interested in the conchology of western North America, as an excellent locality for obtaining a large variety of species both of the northern and southern temperate groups. Its situation and local conditions are perhaps better suited for producing a large number of marine species of mollusca than those of any other point on the coast of temperate North America. It has the advantages of an insular and a continental station combined.

### Topography and Hydrography.

The harbor of Monterey facing north and receiving a constant but greatly moderated ocean swell, broken by the promontory of Point Pinos, has no large influx of fresh water nearer than the Salinas river, 17 miles northward. The rock forming the shore west of the town is granite for three and a half miles, and by disintegration has made a beach of clear white sand, extending nearly around the bay, a distance of 70 miles. For about half this distance sand hills border the shores, succeeded by cliffs of soft post-pliocene sandstone, which border the north end of the bay at Santa Cruz, 25 miles directly north of Monterey. This sandstone also overlies the granite from near low-water to eight fathoms depth, a mile northeast of town, forming a rocky bottom for some distance off shore, and prevails throughout a large part of the north end of the bay.

Monterey has thus the conditions for preserving that saltness and clearness of the water necessary for most marine shells, together with a variety of stations suited for various species, hard, immovable granite, soft sandstone for borers, sand, and at 30 fms., mud. The estuaries, so numerous along the coast, especially northward, are all more or less influential in diminishing the number of species elsewhere, and even at

Santa Cruz, where but a small river is discharged, the number known is less than half that of Monterey.

Carmel Bay lies four miles south of Monterey Bay, and is an exact miniature of the latter, having like it sandstone bluffs at its north end, granite at the south, with a little harbor there, and a small river discharging into it near the middle. I found no sandstone bottom, but the rocks at the north end are perforated by borers, and contain cavities into which the winter storms wash numerous shells not easily obtained elsewhere, and much more productive than at Santa Cruz.

The storms, coming from the southward, are scarcely felt at Monterey, but the eddy produced by the waves being broken at Pt. Pinos, causes numerous shells to wash ashore between there and the town, three and a half miles eastward, so that this portion of the beach is the most productive of any in such specimens.

Numerous whales are cut up annually along here, and probably attract some carnivorous species near shore. A camp of Chinese fishermen, usually living there, increases the number by throwing the entrails of their fish on the shore, from which many deep water species are washed out. Others are found in the pieces of sandstone floated ashore on the eastern beach, attached to the roots of the long kelp (*Macrocystis*) which grows attached to rocks in 5 to 20 fms.

Many shells have been picked up even by the earlier collectors, at Monterey, that were evidently imported, either in ballast or for making shell-work, and though not always easily eliminated from the native list, may be considered at least doubtful where not found living or by several collectors. The same accidental mixture is well known to occur elsewhere in all localities.

## History of Previous Collections at Monterey.

From the researches of Dr. P. P. Carpenter into the history of our mollusca, as given in his admirable reports to the Brit. Assoc. for Adv. of Science, 1856 and 1863, it appears that some of the most characteristic shells of Monterey had reached European cabinets forty to fifty years ago, probably through the trade in hides, etc., then carried on with this coast. It is not unlikely, also, that La Perouse, about 1787, and Vancouver, in 1795, visiting Monterey in their explorations, and accompanied by naturalists, may have obtained some of the species described by early conchologists. The following are most likely to have been first obtained at this place, on account of their abundance and beauty:

*Haliotis Cracherodii*, Leach, Zool. Misc., 1814, and var. *Californiensis*, Sby.
*H. rufescens*, Sby. Bligh Cat., 1822.
*Lucapina crenulata*, Sby. Tank. Catal., 1825.
*Olivella biplicata*, Sby. Tank. Catal., 1825.
*Trivia Californiana*, Sby. Zool. Journal, 1827.

Humboldt and Bonpland, though coming no nearer than *Acapulco*, obtained there in 1804 one species that seems exclusively Californian, probably through some northern coaster, viz., *Haliotis Californiana*, Val., 1833 (*non* Sby.) = *H. rufescens*, Sby.

It does not seem that Capt. Beechey's exploration, in 1825–28, obtained anything at Monterey, though many species common there were collected by him elsewhere.

The first authentic collections made there were those of the late Prof. Nuttall, in 1835, who discovered 70 of the more common land and sea beach shells of California, of which only nine were from Monterey, with some before described.

About 1838 the "Venus" with Ad. Du Petit Thouars visited Monterey, and obtained two or three new species, besides several of Nuttall's, which were redescribed by Deshayes and Valenciennes as new.

The surveying ship "Sulphur," Capt. Belcher, with the eminent conchologist Hinds, passed along in 1838–42, but obtained nothing new here, though discovering 21 species elsewhere in California. Reeve, in Conch. Icon., quotes "*Fissurella Lincolni*, Gray," (*Glyphis aspera*, Esch), "Monterey, Belcher."

Another British surveying ship, the "Pandora," Capt. Kellett, followed much the same route in 1849, without obtaining anything new here.

The same year Col. E. Jewett collected 45 new species in California, and spent a week at Monterey, obtaining there two new ones. Lieut. Green, U. S. N., and Maj. Rich, U. S. A., also visited there, the latter obtaining two out of his three new Californian species at this place, and seven imported species.

Mr. A. S. Taylor sent four new species from Monterey to the Smithsonian Inst. previous to 1860.

The botanist Hartweg visited the place about 1855, and obtained one new species of *Chiton*.

It thus appears from Carpenter's reports that only 22 species, out of 66 known from Monterey in 1860, were discovered there by six collectors.

At that time 277 species were known as Californian, and it is very likely that others, of which the locality was uncertain or wrongly given, came from Monterey. This error of locality is

proved by Nuttall having given "San Diego" for *Arionta Californiensis*, Lea, and is very probable in the cases of several, both of his and Jewett's species, not found at the localities stated by later collectors.

### Collections made in 1861.

I visited Monterey from Aug. 12th to Sept. 25th, the worst season of the year for beach collecting, as the perfect specimens washed up by the storms of the previous winter had been nearly all picked up by summer visitors, and the tides did not fall enough to obtain the rare ones living near extreme low water.

I therefore paid attention chiefly to dredging, though poorly fitted out for it, having only a little boat 15 ft. long, scarcely large enough for myself and two rowers to work in, and too small to go far out in, or to work in after the sea breeze began to be strong. We therefore had to work chiefly from 11 till 2 o'clock, and on many days could do little except along shore.

The following extracts from my notes will serve to show the general conditions under which the collections were made. I must state, that having to attend to all branches of zoology, I did not devote so much time to mollusca as I might otherwise have done, yet collected more species in that branch than in all others together, the whole number of species of animals obtained being about 360, of which 197 were mollusca, excluding varieties.

In Carpenter's report for 1863 only 90 are given as collected by me at Monterey, being those of which I sent him duplicates from there, though I might have sent many more had I known that he intended making local lists. Having more or better specimens of most of them from other points I did not think necessary to send from each one, and reserved all unique specimens from every locality. A larger series from each one was lost while going to him in the "Golden Gate." Besides, there seem to be several locality errors in his table of my specimens, such being liable to occur in spite of every precaution.

Carmel Bay, Aug. 13th, 1861. I visited this bay first, because it had seemed to Prof. Whitney better suited for collecting at than Monterey. Its advantages are a very smooth surface in summer towards the north end, sandstone rocks and small extent. Visited some rocky islets a quarter mile off shore, where I found eleven of the common littoral species living, and five others inhabited by crabs. Have to wait a week for my dredge rope, accidently left at San Francisco.

Aug. 14th. Found two more living and nine dead species along shore. Can find only a rope twenty feet long to dredge with and a little skiff only fit for smooth water, but with these obtained two more living species.

During the following week I collected only beach specimens, usually so poor that I made no note of them, expecting better either from dredging or lower tides. I found scarcely any within the length of my twenty feet rope, the waves drifting the sand too much for most living shells at that depth. The holes in the sandstone furnished most of the twenty-one additional species obtained during that time.

Nearly two days were occupied in going to Monterey to engage a better boat and two oarsmen, who rowed it round the promontory with my coil of rope, etc.

Aug. 20th. Dredged for four hours across mouth of bay, making seven casts in twenty to twenty-five fathoms on a sandy and shelly bottom. Added fifteen species, mostly alive or in good condition, of which *Dentalium Indianorum* and *Thalotia caffea* have never been found on shore, most of others rarely or imperfect.

Aug. 21st. Carried the dredging out to thirty fathoms along the outer limits of the bay, adding six species. Very few living or dead found in the pure sand near middle of bay.

Aug. 22d. Off the mouth of Carmel creek I added two species, two more on kelp, and a muddy bottom in thirty fathoms at south end furnished six, of which *Semele incongrua* has not been found on shore; *Janira dentata* and *Chione simillima* (young, living), only southwards, *Cylichna cylindracea* only northward. In the north end of bay I found twenty-five more species at twenty to thirty fathoms sand, *Cœcum crebricinctum* and *Fenella pupoidea* not found on beach.

Monterey, Aug. 26th. Moved here to try collecting in a new field. To-day examined the clay-stones washed ashore on roots of kelp, finding nine species of boring or nestling bivalves, besides a *Crepidula*. Many are found one within another, having successively inhabited the burrow of the original excavator.

Aug. 27th. Venturing out as far as was safe we cast in forty fathoms, one and a quarter miles N. E. of Pt. Pinos, drawing up the bag half full of mud with but three species, of which, however, *Yoldia amygdala* and *Acila castrensis* are not be found on shore. In thirty fathoms shelly sand obtained many fragments, but only two additions, *Leda cælata*, a deep water species only, besides twenty or more before obtained. A third cast, in twenty fathoms muddy sand, gave eight additions, and I made two or three others landwards to ten fathoms, the last furnishing the beautiful *Cancellaria Cooperi*, of which I found only one more broken specimen at San Diego, though Dr. Canfield has since found one on the beach at Monterey.

Aug. 28th. Visited Cypress Point, south of Pt. Pinos, where I found *Arionta Californiensis*, var. *vincta* and *Lysinoe Dupetithou-*

*arsi* in the grove ; but the surf is so heavy on the beach that only the thick *Lucina Californica* withstands it unbroken.

Aug. 29th. Made about twelve casts in from seven to twenty fathoms west of town, and obtained only five additions, though with many living or better specimens of others before collected.

Aug. 30th to Sept. 5th. The tides running lowest this week I collected chiefly along shore, finding thirty-three additional species, chiefly dead.

Sept. 6th. To try a new ground I sailed three miles N. N.W. of town toward middle of bay, finding a depth of thirty-five to forty fathoms muddy sand, but obtained only the *Cæcum*, a young living *Machæra patula* and four other species found at low water.

Sept. 9th. Made five casts in three to ten fathoms near town, adding only two to the list.

Sept. 10th. Tried again in from five to twenty fathoms, adding three species. Considered the chance of finding more in that direction too small to pay expenses.

Sept. 11th. Dredged along the east or weather beach, though my boatman thought it dangerous on account of the heavy surf. Found the sandstone reef a mile N. E. of town from which the beach fragments are broken off, and in two out of six casts in seven to eight fathoms, obtained pieces of rock with five additional species living on them, and eight others living, before found dead.

Sept. 12th. Packed up everything, intending to take the steamer, which was daily expected, for a more southern locality. It passed Monterey however without stopping, and I was obliged to wait for its next trip down the coast. During the following week I collected only on shore, adding fifteen species.

Sept. 20th. With a hand-net I dredged up three large specimens, living, of *Lunatia Lewisii*, which I could see crawling on the sand in about twelve feet of water. Also over one hundred of *Olivella biplicata*, which burrows in the sand in colonies about extreme low water.

Sept. 21st. Dredged in ten to twenty fathoms off Quarry Point, and near the Whalers' tryworks, without finding anything new.

Sept. 23d. Found four more species in the cavities made by borers in the clay-rock, making in all nine borers and five nestlers.

Sept. 24th. Dredged in afternoon for two miles on sandstone reef, visited on 11th, making seven casts, but only an occasional fragment could be broken off, from which I obtained about twenty species, mostly living and good, but none new. Tried again in thirty-five fathoms a mile N. E. of Quarry Point, getting nothing.

Sept. 25th. Searched beach for the last time as far as Point

Pinos, finding three additions. At the point the light-house keeper showed me *Lucapina crenulata*, saying that it was only found alive at spring tides.

### Summary and Additions.

The whole number obtained thus consisted of one hundred and twenty-six first found on shore, and eighty first obtained by dredging, (including nine which are scarcely more than varieties of others). I also obtained twenty of the dredged species afterwards on shore, and all but twelve of them have since been found above tides by myself or others, usually, however, dead and imperfect.

Many, on the other hand, which I dredged only dead, have since been found by Dall, Stearns, Newcomb and Canfield living among the granite rocks at extreme spring tides, low water, in midsummer or winter. Harford has found others by wading in below tides, and carrying large stones ashore with the animals adhering to them. In such places dredging is impossible. These gentlemen have also added largely to the list of Monterey shells, which now number about 316 species. Had I wished merely to make a local list when collecting there, I might have increased it much by preserving many species which I found only in a fragmentary state, and thought not worth preserving, as I knew they could be obtained better elsewhere. I can even now recall to memory many such observed on the beach, but do not include them.

Although imperfect as a local list, the number is remarkable compared with what I found at Santa Cruz during a year's residence some years later, when I visited the beach often and during almost every monthly low tide. I got there thirty-eight marine Acephala, seventy-nine Gasteropoda, ten terrestrial, two fresh water Acephala, five Gasteropoda, total 134 only.

And small as the number is, it includes fifty species not in my Monterey list, (which, however, are mostly found there,) and I have therefore given them with the former locality, as it is situated on the same bay only twenty-five miles north of Monterey.

In the "Geographical Catalogue" I included the additions made previous to 1867 by the gentlemen above mentioned, and in my manuscript report have tabulated their contributions more fully. Since that date, however, twenty or more new species have been discovered or determined by them and Carpenter, which are not yet published. It would be therefore improper for me even to give their manuscript names, as they will doubtless be all published in due time. Six are Chitonidæ, three Patelloid, the rest mostly minute.

The whole number given by McAndrew in Brit. Assoc. Report for 1856, as found by him at "south of Spain and Mediterranean Sea," was only 425, which, considering the great extent of the latter sea, reaching south to lat. 32°, makes it probable that the species near Cadiz, though so much longer investigated, do not number more than are known at Monterey.

About 600 species are known in all California between lat. 32° and 42°, including land and fresh water, (which are not represented at Monterey by more than ten species.) As may be supposed, from the peculiar conditions combined at Monterey, many species rare there are numerous in other localities, and indeed many are only found there dead, having been washed away from the places where they lived.

In the following list I have given the results of my collecting at Monterey and Santa Cruz, marking only those species with an * that were first obtained by me, though many others were undescribed at the time I collected them, and some of these were even received by Carpenter later than mine, from the naturalists of the N. W. Boundary Survey. Still, as they were collecting for some years before I commenced, they are entitled to priority of discovery even in doubtful cases. The name of discoverer at Monterey is given when known.

Several of the Santa Cruz additions were discovered first by me at other places and are marked with a †. Many others, which I discovered at more southern localities, have since been found at Monterey, but I do not include them here. I include 7 southern species dredged in Carmel Bay, but not yet discovered north of Point Pinos. The collection was made for the State Geological Survey of California, under direction of Prof. J. D. Whitney. The remarks given are usually the result of observations made since 1861.

## Catalogue of Collections.

The original number is given first; then the Geographical Catalogue number.

349 3 *Terebratula unguiculus*, Cpr.
Str. Fuca to San Diego, near l. w. to 20 fms.
12 dead, 20 fms., shell sand. Lives just below tides.

401 6 *Waldheimia Grayi*, Dav.
New Year Point to Catalina I.—Japan.
2 dead, 20 fms., shell sand. Santa Cruz, bch., valves, rare.

927 12 *Xylotrya setacea*, Tryon.
S. F. Bay (to San Pedro?).
Santa Cruz, common. In timber submerged.

424 13 *Zirphœa crispata*, Linn.
Str. Fuca to San Diego—N. Atlantic.
Valves, common on beach. Syn. ? *Z. Gabbii*, Tryon.

433 14 *Pholadidea penita*, Conr.
Str. Fuca to Santa Barbara, l. w.
Many in clay rock. Sta. Cruz, between tides.

433a 15 *Pholadidea ovoidea*, Gld.
Baulines Bay to San Diego; rare.
Rare in clay rock. Smithsonian collectors disc.

444 16 *Netastomella Darwinii*, Sby.
Str. Fuca to San Diego—S. America.
One in clay rock, one living, 8 fms.

1452 17 *Martesia intercalata*, Cpr. ?
Farallone Is. to Mazatlan—(in Haliotis.)
Santa Cruz, rare. Syn. ? *Navea Newcombii*, Tryon.

526 18 *Parapholas Californica*, Conr.
Baulines Bay to San Diego.
One in clay stone, beach. Sta. Cruz, below tides.

528 19 *Saxicava pholadis*, Linn.
Str. Fuca to Santa Barbara—Universal?
Ten in clay stone, bch. Jewett & Smithsonian coll.

562 22 *Platyodon cancellatus*, Conr.
Baulines Bay to San Diego.
Sta. Cruz, common living, l. w. Between tides.

402 23 *Cryptomya Californica*, Conr.
Str. Fuca to San Diego.
Valves, bch. to 20 fms. Lives in brackish bays.

382 24 *Schizothœrus Nuttalli*, Conr.
Str. Fuca to San Diego—Sitka—Japan.
Valves, one dead, 30 fms. Lives in brackish bays.
Smithsonian coll.

378 29 *Clidiophora punctata*, Conr.
Str. Fuca to San Diego, l. w. to 30 fms.
3 living, 30 fms. mud. Sta. Cruz, valves.

676 33 *Thracia curta*, Conr.
Str. Fuca to San Diego.
Valves, rare, bch. (dredged ?) Lives below tides.

483 35 *Lyonsia Californica*, Conr.
Str. Fuca to Santa Barbara.
Valves, rare, bch. Lives below tides.

480 36 *Lyonsia nitida*, Gld.
S. F. Bay to San Diego. (Young ?)
15 living, 5—20 fms. Perhaps = 35.

907 37 *Entodesma saxicola*, Baird.
Str. Fuca to Monterey.
Not rare, dead, Sta. Cruz. Lives below tides.

483 39 *Mytilimeria Nuttalli*, Conr.
Str. Fuca to San Diego.
1 on bch., dead. Lives below tides.

461 41 *Solen sicarius*, Gld.
Str. Fuca to San Pedro—Japan.
2 dead, 10—20 fms. muddy sand. Lives in brackish bays.

508 45 *Machæra patula*, Dixon.
Str. Fuca to San Diego—Kamtschatka, Japan.
2 young, living, 35 fms. mud. Lives at extreme l. w.

598 47 *Psammobia rubroradiata*, Conr.
Str. Fuca to San Diego—Sitka.
Valves rare, bch. to 10 fms. Lives below tides.

331 48 *Macoma secta*, Conr.
Baulines Bay to San Diego—Japan?
Valves common, bch. Smithsonian coll.

*324 50 *Macoma indentata*, Cpr.
Monterey; (to San Diego?)
Valves rare, beach.

†985 51 *Macoma yoldiformis*, Cpr.
Str. Fuca to San Pedro.
Valves rare, Santa Cruz.

365 52 *Macoma nasuta*, Conr.
Str. Fuca to San Diego—Kamtschatka.
Valves, bch. to 20 fms. Lives in brackish bays.

365a 53 *Macoma inquinata*, Desh.
Str. Fuca to Monterey. Estuaries.
One dead, 5 fms. Lives in brackish bays.

377 58 *Mera obtusa*, Cpr.
Str. Fuca to San Diego. (= *modesta*, var.?)
6 living, 7—40 fms. muddy sand.

350 59 *Mera variegata*, Cpr.
Str. Fuca to Catalina I. Bch. to 120 fms.
1 living, 25 fms. sand, 5 valves, 20—35 fms.

399 61 *Mera salmonea*, Cpr.
Str. Fuca to Monterey. Bch. to 20 fms.
7 living, 20 fms., 24 valves 20—35 fms. Lives just below tides.

408 62 *Tellina Bodegensis*, Hds.
Str. Fuca to San Diego—Japan.
Valves common, bch., one young living, 20 fms. sand. Lives near extreme l. w.

1168 70 *Semele*
Str. Fuca to Monterey.
Two valves dredged. White var. Valves, rare at mouth of Saquel Creek, Santa Cruz.

*407 73 *Semele incongrua*, Cpr.
Carmel Bay to Catalina I., 16—40 fms. rare.
5 living, many valves, 20—30 fms. muddy sand, Carmel only (=*rubrolineata*, Conr. var. ?)

527 75 *Cumingia Californica*, Conr.
Monterey to San Diego—Mazatlan.
4 in clay stones, bch., 2 liv., 7 fms. rock. Sta. Cruz, rare.

606 81 *Standella Californica*, Conr.
Str. Fuca to San Pedro.
Sta. Cruz, com. on bch. dead. Lives just below tides.

469 84 *Standella falcata*, Gld.
Str. Fuca to Monterey—Kodiak.
4 valves, 10 fms. Lives bel. tides towards Salinas R.

295 88 *Pachydesma crassatelloides*, Conr.
Santa Cruz to San Diego. (Str. Fuca ?)
Sta. Cruz, common. Smiths. coll,, from Salinas bch. ?

367 89 *Psephis tantilla*, Gld.
Str. Fuca to Catalina I., l. w. to 25 fms.
1 living, 8 fms., 2 in 25 fms. sand. Sta. Cruz, valves, bch.

375 90 *Psephis Lordi*, Baird.
Str. Fuca to San Diego; (southern variety.)
3 living, 30 fms. mud.

*1058 95 *Lioconcha Newcombiana*, Gabb.
Monterey to Catalina I.—rare.
3 young, 30 fms. mud, living. Colorless specimens.

537 98 *Chione simillima*, Sby.
Carmel Bay to San Diego.
4 young, living, 30 fms. mud. Carmel Bay only.

731 100 *Tapes tenerrima*, Cpr.
Str. Fuca to San Diego—not "Panama."
One valve, 20 fms. Lives below tides, Santa Cruz.

642 101 *Tapes laciniata*, Cpr.
Monterey to San Diego— (=*staminea*, var. ?)
3 young living, 20 fms. Maj. Rich, U. S. A., disc.

436 102 *Tapes staminea*, Conr.
Str. Fuca to San Diego—Margarita Bay.
Many living, l. w. sand. Chiefly in brackish bays.

436a 103 *Tapes staminea*, var. *Petitii*, Desh.
Str. Fuca to Monterey—Kamtschatka.
Many living, l. w. sand. In fresher water. Smiths. coll.

436b 104 *Tapes staminea*, var. *ruderata*, Desh.
Str. Fuca to Santa Cruz—Oünalaska.
Many dead, in clay rock. A rough stunted var.

436c 105 *Tapes staminea*, var. *diversa*, Sby.
Baulines Bay to San Diego.
Many living, l. w. muddy sand. Colored by mud when growing?

436d 106 *Tapes staminea*, var. *tumida*, Sby.
In cavities of rocks.
Rare in clay rock, bch. Take the form of the cavity they grow in.

436e 107 *Tapes staminea*, var. *orbella* (Cpr. ?)
In cavities of rocks.
Rare in clay rock, bch. Grow in burrows of No. 142.

499 108 *Saxidomus gracilis*, Gld.
Baulines Bay to San Diego—(= *aratus*, Gld. ?)
1 young, dredged dead.

499a 109 *Saxidomus Nuttalli*, Conr.
S. F. Bay to San Diego—Sitka ? Japan ?
Valves, bch. to 20 fms. A brackish water var. of *gracilis*, Gld. ?

434 112 *Rupellaria lamellifera*, Conr.
Farallone Is. to San Diego.
Many in clay rock, bch., 20 young, 10—20 fms., dead. Jewett coll.

438 113 *Petricola carditoides*, Conr.
Str. Fuca to San Diego—Sitka.
Many in clay-rock, bch., 5 in 8 fms., liv'g. Jewett coll.

460 114 *Chama exogyra*, Conr.
Baulines Bay to San Diego—Mexico.
Valves, bch. to 10 fms. (= reversed *pellucida ?*)

460a 115 *Chama pellucida*, Sby.
Farallone Is. to San Diego—S. America.
Valves, bch. to 10 fms. Smithsonian coll.

387 117 *Cardium corbis*, Martyn.
Str. Fuca to S. Barbara—Sitka, Kamtschatka.
Valves, bch. to 10 fms. Lives chiefly in brackish bays.

639 118 *Cardium quadragenarium*, Conr.
Monterey to San Diego.
One valve, 20 fms. Carmel Bay?

368 119 *Cardium blandum*, Gld.
Str. Fuca to Monterey—Sitka; Asia.
Many valves, 10—20 fms, some fresh.

*381 120 *Cardium centifilosum*, Cpr.
Carmel Bay to Catalina I. 20—40 fms.
One living, 15 fms. mud. Carmel only.

409 129 *Miodon prolongatus*, Cpr.
Str. Fuca to Monterey.
One living, 20 fms. Carmel Bay.

403 132 *Lazaria subquadrata*, Cpr.
Str. Fuca to San Diego.
One living, 20 fms., many valves, bch. Lives near extreme l. w., rocks.

490 135 *Lucina Californica*, Conr.
Santa Cruz to San Diego.
Many valves, bch. Lives near extreme l. w., rocks.

435 142 *Diplodonta orbella*, Gld.
Str. Fuca to S. Diego—in holes of rocks.
4 in clay-rock, bch.

437a 144 *Kellia Laperousii*, var. *Chironii*, Cpr.
Str. Fuca to San Diego.
10 in clay-rock, bch., 1 living, 8 fms.

— 145 *Kellia rotundata*, Cpr.
Monterey; (= *Laperousii*, var., or 146 ?)
Taylor disc.

437b 146 *Kellia suborbicularis*, Mont. ?
Str. Fuca to San Diego—Mex.—Pan.—Europe.
2 in clay-rock, bch. = *K. Laperousii*, var. ?

827 162 *Pisidium occidentale*, Newc.
Truckee R., to Santa Cruz, Cal.
Santa Cruz, in Soquel Creek only.

922 165 *Margaritana falcata*, Gld.
S. Cruz, California, north—Nevada; Montana.
Santa Cruz, in San Lorenzo Creek.

489 172 *Mytilus Californianus*, Conr.
Str. Fuca to San Diego—Q. Charlotte's I.
Common living, l. w. Nuttall disc.

875 173 *Mytilus edulis*. Linn.
Monterey, north—Japan; N. Atlantic.
Sta. Cruz, near river. Chiefly in brackish bays.

576 175 *Septifer bifurcatus*, Rve.
Farallone Is. to S. Diego. (Not *Myt. bifurc.*, Conr.)
Not rare living, Santa Cruz.

815 177 *Modiola modiolus*, Linn.
Monterey, north—Asia; N. Atlantic.
Valves, common on bch., many young living, 10 fms.
Jewett coll.

440 178 *Modiola fornicata*, Cpr.
Monterey to San Pedro.
Valves not rare on bch. Taylor disc.

400 179 *Modiola recta*, Conr.
Santa Cruz to San Diego.
Valves rare on bch., 2 young living, 20 fms. Sta. Cruz, valves rare.

439 181 *Adula falcata*, Gld.
San Francisco to San Diego—New Zealand ?
10 in clay-rock, bch. S. Cruz, living l. w. Rich, disc.

*1157 182 *Adula stylina*, Cpr.
Str. Fuca to Monterey.
4 in clay-rock, bch. Smithsonian coll.

351 189 *Axinœa intermedia*, Brod. ?
Monterey to San Diego—South America.
22 living, 20 fms. Southern var. of 191 ?

1158 191 *Axinœa subobsoleta*, Cpr.
Str. Fuca to Sta. Cruz (= *septentrionalis* var. ?)
Santa Cruz, 1 valve.

450 193 *Acila castrensis*, Hinds.
Str. Fuca to San Diego—Sitka.
2 dead, 20—40 fms., muddy sand. "1 in sand 7 fms., Sitka." (Hinds.)

471 194 *Leda cælata*, Hinds.
Bodega Bay to San Diego ; 6—20 fms.
9 living, 20 fms. sand. "6—10 fms. Bodega." (Hds.)

471a 195 *Leda cuneata*, Sby. ?
Monterey to San Diego—Peru.
4 living, 7 fms. sand. Var. of last ?

449 200 *Yoldia amygdala*, Val.
Str. Fuca—Monterey.
1 living, 40 fms. mud.

*1189 201 *Yoldia Cooperi*, Gabb.
Santa Cruz to San Pedro—Beach, valves.
1 young valve, 8 fms. = *Y. impressa*, Conr., foss. ?

348 204 *Lima dehiscens*, Conr.
Monterey to S. Diego—(= *orientalis*, Ad. ? China.)
6 valves, 20 fms. Lives below tides.

366 206 *Pecten hastatus*, Sby.
Str. Fuca to Santa Barbara—Sitka ; Aliaska.
Many valves, to 30 fms. Lives below tides.

366a 207 *Pecten hastatus*, var. *Hindsii*, Cpr.
Str. Fuca to Santa Cruz—Sitka.
Santa Cruz, common. Valves on bch.

376 210 *Pecten latiauritus*, Conr.
Monterey to San Diego.
Two young living, 30 fms.

410 213 *Janira dentata*, Sby.
Carmel Bay to San Diego—Gulf California.
1 *flat* valve, 20 fms. Carmel only.

363 214 *Hinnites giganteus*, Gray.
Str. Fuca to San Diego.
Many valves, bch. to 30 fms. Smithsonian coll.

448 215 *Ostrea lurida*, Cpr.
Str. Fuca to San Diego.
6 valves, dredged. Lives in brackish bays. Nuttall coll.

456 220 *Placunanomia macroschisma*, Desh.
Str. Fuca to San Diego—Japan.
Valves, bch. to 20 fms. Sta. Cruz, rare, living, l. w.

— 221 *Anomia lampe*, Gray.
"Monterey, 60 fms." San Pedro to Mexico.
Maj. Rich coll.? brought up on anchor?

627 228 *Haminea vesicula*, Gld.
Santa Cruz to San Diego—Cape St. Lucas.
Santa Cruz, living in Soquel Creek estuary.

589 231 *Tornatella punctocælata*, Cpr.
Santa Cruz to San Diego.
Santa Cruz, dead, bch. San Pedro, 6 fms., living.

357 232 *Tornatina culcitella*, Gld.
Monterey to San Diego.
1 living 10 fms., 1 dead 20 fms. San Diego, l. w., living.

357a 233 *Tornatina cerealis*, Gld.
Monterey to San Diego (= *culcitella*, var.?)
1 dead 5 fms., 1 dead 35 fms. Sta. Cruz, bch., dead.

379 236 *Cylichna cylindracea*, Linn.
Monterey to San Diego—Europe.
1 living, 3 dead, 30 fms. mud.

*465 — *Tornatina harpa*, Dall, MS.
1 dead, 20 fms.

*1000 246 *Doris albopunctata*, Cp.
Baulines Bay to Catalina I.
Santa Cruz, rare on stones, extreme l. w.

*516 248 *Doris Montereyensis*, Cp.
San Francisco Bay to Barbara I.
2 living, 7 fms. rock. Stones, extreme l. w.

*1002 249 *Triopa Catalinæ*, Cp.
Baulines Bay to Catalina I.
Santa Cruz, rare on stones, extreme l. w.

*675 253 *Phidiana iodinea*, Cp.
Santa Cruz to San Diego.
Santa Cruz, rare on algæ, extreme l. w.

510 256 *Ariolimax Columbianus*, Gld.
Str. Fuca to Santa Barbara.
Not rare, in woods, in damp places.

837 264 *Succinea Oregonensis*, Lea.
Oregon to Monterey, Cal.
Santa Cruz, common, in damp places.

899 271 *Macrocyclis Vancouverensis*, Lea.
Santa Cruz, Cal. north; Idaho.
Santa Cruz, common.

939 276 *Pseudohyalina milium*, Morse?
Monterey to Nevada Co., Cal.—Maine.
Santa Cruz, rare in decayed stumps.

†1196 291 *Helix sequoicola*, Cp.
Santa Cruz Co., Cal.
Santa Cruz. In or near Sequoia forest, rare.

492 294 *Helix Dupetithouarsi*, Desh.
Monterey, Cal. (Point Cypress.)
3, in or near Cypress Grove. "Voy. Venus," disc.

909 306 *Helix Californiensis*, Lea.
Monterey, Cal. Var. *vincta*, Val.
Young found in woods. Nuttall disc.? rare.

1166 307 *Helix nemorivaga*, Val.
San Francisco to Monterey.
Santa Cruz, common. A variety of next.

912 308 *Helix Nickliniana*, Lea.
Santa Cruz to Mendocino Co., Cal.
Santa Cruz, rare.

858 310 *Helix arrosa*, Gld.
Santa Cruz to Mendocino Co., Cal.
Santa Cruz, common, in oak groves, etc.

920 311 *Helix exarata*, Pfeiff.
S. F. Bay to Santa Cruz Co., Cal.
Santa Cruz, common. In poplar, willow, etc.

901 318 *Aplodon Columbianus*, Lea.
Wash. Territory to Santa Cruz, Cal.; Sitka.
Santa Cruz, common in damp woods and fields.

1199 319 *Aplodon germanus*, Gld.
"Oregon." Probably = *Columb.* var.
Santa Cruz, more rare. Damp woods and fields.

1214 341 *Limnophysa ferruginea*, Hald.
"Oregon." (= *humilis*, Say?)
Santa Cruz, common in streams.

840 364 *Physa Gabbii*, Tryon.
Mountain Lake, S. F. Co., to Los Angeles.
Santa Cruz, common in San Lorenzo R.

1234 378 *Planorbis tumens*, Cpr.
Petaluma, Cal., to Mazatlan.
Santa Cruz, in San Lorenzo R.

854 381 *Gyraulus vermicularis*, Gld.
Walla Walla, W. T., to Santa Cruz, Cal.
Santa Cruz, in San Lorenzo R.

1197 395 *Ancylus fragilis*, Tryon.
San Francisco to Santa Cruz.
Santa Cruz, in San Lorenzo R.

346 402 *Dentalium Indianorum*, Cpr.
Str. Fuca to Santa Barbara.
12 living, many dead, 20—30 fms. Probably = *pretiosum*, Nutt.

830 406 *Cryptochiton Stelleri*, Midd.
Str. Fuca to Monterey—Kamschatka.
Santa Cruz, l. w., common. Smithsonian coll.

517 408 *Tonicia lineata*, Wood.
Str. Fuca to Monterey—Sitka; Kamtschatka.
Valves, bch., 1 living, 7 fms. rock. Smithsonian coll.

310 410 *Mopalia muscosa*, Gld.
Str. Fuca to San Diego.
Many living, l. w. Nuttall and Smithsonian coll.

411 *Mopalia Wossnessenskii*, Midd. ?
Str. Fuca to Santa Cruz—Sitka.
Santa Cruz, l. w.

1412 412 *Mopalia Kennerleyi*, Cpr.
Str. Fuca, W. T., to Monterey.
Valves, on bch.

1367 414 *Mopalia Hindsii*, Gray.
Str. Fuca to Monterey.
Santa Cruz, l. w.

1368 416 *Mopalia vespertina*, Gld.
Str. Fuca to Monterey, Cal.
Santa Cruz, common. Probably = next.

1368a 417 *Mopalia lignosa*, Gld.
Str. Fuca to Monterey—Sitka.
Valves, bch. Hartweg coll.

— 418 *Mopalia acuta*, Cpr.
" Monterey " (Nuttall coll.)
Nuttall, disc.

1087 421 *Acanthopleura scabra*, Rve.
Str. Fuca to Santa Barbara.
Nine living, l. w. Nuttall, disc.

— 423 *Ischnochiton Magdalensis*, Hds.
Monterey to San Diego—Lower Cal.
Smithsonian coll.

*1073 427 *Lepidopleurus pectinatus*, Cpr.
Santa Cruz to Catalina I.
Santa Cruz, common. Extreme l. w.

518 428 *Lepidopleurus Mertensii*, Midd.
Str. Fuca to Monterey.
2 living, 7—20 fms., rock. Smithsonian coll.

329 430 *Trachydermon interstinctus*, Gld.
Puget's Sound to Monterey.
2 living, l. w. ?

— 435 *Trachydermon Hartwegii*, Cpr.
San Francisco to Monterey.
Hartweg disc.

325 436 *Trachydermon Nuttallii*, Cpr.
Str. Fuca to Monterey.
1 living, 20 ft., rock. Nuttall disc.

— 437 *Trachydermon flectens*, Cpr.
Str. Fuca to San Diego.
Smithsonian coll.

420 — ——— ———
Chitonid indet.
Not rare, living, l. w.

857 441 *Nacella instabilis*, Gld.
Str. Fuca to Monterey.
Rare, dead on bch. Sta. Cruz, bch., dead, lives on algæ ?

416 442 *Nacella insessa*, Hds.
Baulines Bay to San Diego.
16 dead, bch. Lives imbedded in algæ, l. w.

1237 445 *Nacella paleacea*, Gld.
Santa Cruz to Santa Barbara.
Santa Cruz, living, common, on narrow grass, l. w.

*344 446 *Nacella triangularis*, Cpr.
Baulines Bay to Monterey.
4 dead, 20—30 fms. Probably lives on algæ.

308 448 *Acmæa patina*, Esch.
Str. Fuca to San Diego—Mazatlan—Sitka.
Many living, l. w. Smithsonian coll.

309 449 *Acmæa pelta*, Esch.
Str. Fuca to San Diego—Sitka.
Many living, l. w. Smithsonian coll.

309a 450 *Acmæa pelta*, var. *Asmi*, Midd.
Baulines Bay to Monterey—Sitka ?
6 dead, l. w. Parasitic on living shells.

306 451 *Acmæa persona*, Esch.
Str. Fuca to San Diego—Mazatlan—Sitka.
Many living, l. w.

307 452 *Acmæa scabra*, Nutt.
Baulines Bay to San Diego—Mazatlan.
Many living, l. w. Common in brackish bays.

305 453 *Acmæa spectrum*, Nutt.
Cape Mendocino to San Diego.
Many living, l. w.

472 455 *Acmæa rosacea*, Cpr.
Monterey to Santa Barbara.
4 dead, dredged. "A good species." Cpr. MS.

328 456 *Lottia gigantea*, Gray (Sby. ?).
Farallone Is. to San Diego—S. A. ?
Many living, l. w. Smithsonian coll.

330 457 *Scurria mitra*, Esch.
Str. Fuca to San Diego—Sitka.
Many dead, l. w. Lives at extreme l. tide. Nuttall coll.

330a 458 *Scurria mitra*, var. *funiculata*, Cpr.
Str. Fuca to Monterey; deep water.
6 dead, 20 fms. Near Pt. Pinos.

*826 460 *Rowellia radiata*, Cp.
Farallone Is. to Catalina I.
Rare, bch., 1 dead. Santa Cruz, living, l. w.

338 461 *Fissurella volcano*, Rve.
Santa Cruz to San Diego.
Many dead, bch. to 20 fms. Nuttall disc. ?

332 463 *Glyphis aspera*, Esch.
Str. Fuca to San Diego—Sitka.
Many dead, bch. to 20 fms. Lives near l. w.

514 464 *Glyphis densiclathrata*, Rve.
Baulines Bay to San Diego.
Many dead, 1 living, 7 fms. Animal differs from that of 332.

714 465 *Lucapina crenulata*, Sby.
Monterey to San Diego.
1 young dredged dead, ½ inch long. Lives near l. w.

392 466 *Puncturella cucullata*, Gld.
Str. Fuca to Monterey.
1 bch., 5 dead, 20 fms.

*415 470 *Clypidella bimaculata*, Dall (MS.)
Farallone Is. to Barbara I.
3 dead, 10—20 fms. Lives near l. w.

*466 471 *Emarginula bella*, Gabb.
Santa Cruz to Monterey.
3 dead, 10—20 fms. Near Pt. Pinos.

301 472 *Haliotis Cracherodii*, Leach.
Farallone Is. to San Diego—Lower Cal.
Many living, l. w.

333 475 *Haliotis rufescens*, Sw.
Farallone Is. to San Nicolas I.—Galapagos?
10 dead, bch. to 10 fms. Less numerous.

497 476 *Haliotis Kamtschatkana*, Jonas.
Str. Fuca to Monterey—Japan.
1 dead, bch. Rare.

353 478 *Phasianella pulloides*, Cpr.
Santa Cruz to San Diego.
20 dead, 20 fms. Santa Cruz, rare, living, l. w.

— 479 *Pomaulax undosus*, Wood.
Santa Barbara to Cape St. Lucas—Monterey?
Nuttall, coll.?

364 480 *Pachypoma gibberosum*, Chem.
Str. Fuca to Catalina I.—New Zealand?
Many dead at Pt. Pinos, 2 living, 2—7 fms., rock. Smithsonian coll.

315 481 *Leptothyra sanguinea*, Cpr.
Str. Fuca to San Diego—Japan—Europe?
Many dead, bch., 3 living, 2—7 fms., rock. Jewett and Smithsonian coll.

*315a 483 *Leptothyra paucicostata*, Dall (MS.)
Monterey.
4 dead, dredged?

*519 485 *Liotia acuticostata*, Cpr.
Monterey to Catalina I.
4 dredged, dead.

— 489 *Trochiscus Norrisii*, Sby.
Santa Barbara to San Diego—Monterey?
Nuttall coll.?

— 490 *Trochiscus convexus*, Cpr.
"Monterey" (Jewett).
Jewett disc. ? = 489 ?

302 491 *Chlorostoma funebrale*, A. Ad.
Str. Fuca to San Diego—Sitka.
Many living, l. w., on kelp. Nuttall coll.

302a 492 *Chlorostoma funebrale*, var. *subapertum*, Cpr.
Neeah Bay, W. T., to Monterey.
Rare living, l. w., on kelp.

316 495 *Chlorostoma brunneum*, Phil.
Cape Mendocino to Santa Barbara.
Many living, l. w., on kelp. Smithsonian coll.

385 496 *Chlorostoma Pfeifferi*, Phil.
Baulines Bay to Nicolas I., Cal.
10 dead, bch. Jewett coll.

311 499 *Calliostoma canaliculatum*, Mart.
Str. Fuca to San Diego, Cal.
12 dead, bch. Sta. Cruz. Nuttall and Smithsonian coll.

312 500 *Calliostoma costatum*, Mart.
Str. Fuca to Barbara I., Cal.—Sitka.
Many dead, bch., 5 living, 7 fms. Santa Cruz. Nuttall and Smiths. coll.

523 501 *Calliostoma annulatum*, Mart.
Str. Fuca to San Diego.
12 dead, bch., 5 living, 7 fms. Santa Cruz. Nuttall and Smithsonian coll.

*602 503 *Calliostoma tricolor*, Gabb.
New Year Point to San Diego.
Santa Cruz, 20 dead on Soquel bch.

*476 504 *Calliostoma supragranosum*, Cpr.
Santa Cruz to Monterey.
4 young, dredged dead. Santa Cruz, also.

*530 506 *Calliostoma splendens*, Cp.
Monterey to Sta. Barbara.
2 young, dredged dead.

*356 507 *Thalotia caffea*, Gabb.
Carmel Bay, 20 fms. 1 dredged

355 508 *Phorcus pulligo*, Mart.
Str. Fuca to San Diego—Sitka.
2 dead, bch., 2 dead dredged. Lt. Green coll.

359 512 *Gibbula succincta*, Cpr.
Str. Fuca to Barbara I., Cal.
2 dead, 20 fms.

352 516 *Margarita pupilla*, Gld.
Str. Fuca to Monterey.
10, bch. to 20 fms., dead.

352a 517 *Margarita pupilla*, var. *salmonea*, Cpr.
Monterey to Catalina I.
1 living, 20 dead, 20 fms.

354 518 *Margarita acuticostata*, Cpr.
Baulines Bay to Santa Barbara.
1 living, 10 fms., 4 dead.

1240 520 *Margarita lirulata*, Cpr.
Str. Fuca to Baulines Bay.
Santa Cruz, 1, bch.

*388 546 *Cœcum crebricinctum*, Cpr.
Monterey to San Diego.
10 living, 10 dead, 5 to 35 fms., sand.

— 553 *Cerithidea Californica*, Hald.
Baulines Bay to San Diego—Mazatlan ?
Nuttall coll. ? Salinas R. ? (= *sacrata*, Gld.)

422a 555 *Bittium filosum*, var. *esuriens*, Cpr.
Str. Fuca to San Pedro.
Many dead, bch.

422b 556 *Bittium attenuatum*, Cpr.
Str. Fuca to Monterey.
2 dead, bch. (= 555 ?) Taylor disc.

387 557 *Bittium quadrifilatum*, Cpr.
Monterey to San Diego.
Many dead, bch. Merging into 559.

387a 559 *Bittium armillatum*, Cpr.
Farallone Is. to San Diego.
20 dead, bch. to 20 fms.

369 524 *Galerus fastigiatus*, Gld.
Puget's Sound to Monterey— Vancouver's I.
1 living, 5 dead, 8—20 fms. Mistaken for *contortus* in Geog. Cat.

— 526 *Crucibulum spinosum*, Sby.
San Pedro south to Peru, South America.
Nuttall coll. ?

1150 527 *Crucibulum scutellatum*, Gray.
Santa Cruz, Cal.—Lower Cal. to Peru.
Santa Cruz, 1 dead. Imported ?

412 530 *Crepidula dorsata*, var. ? *lingulata*, Gld.
Str. Fuca to Mazatlan.
1 living, 8 fms. rock, 9 dead, to 20 fms. Santa Cruz, bch., common.

413 532 *Crepidula adunca*, Sby.
Str. Fuca to Sta. Barbara—Mexico?
Many dead on bch., to 20 fms. Sta. Cruz, bch., common.

420 534 *Crepidula navicelloides*, Nutt.
Str. Fuca to San Diego.
Rare, dead on bch. to 20 fms. Sta. Cruz, living, l. w. Nuttall disc.

420b 536 *Crepidula navicelloides*, var. *fimbriata*, Rve.
Str. Fuca to San Pedro.
4, clay rock on bch. In holes of borers.

420c 537 *Crepidula navicelloides*, var. *explanata*, Gld.
Str. Fuca to San Pedro.
8, clay rock on bch., 1 living, 8 fms., in holes of borers. Voy. "Venus" coll.

414 539 *Hipponyx antiquatus*, Linn.
Monterey south?—S. America. Atlantic.
Many dead, bch. to 20 fms. Including *serratus*, Cpr.?

475 541 *Capulus tumens*, Cpr.
Monterey to San Diego and islands.
Many dead, bch. to 20 fms.

317 572 *Litorina planaxis*, Nutt.
Mendocino to San Diego—Sitka?
Many living, bch.

318 574 *Litorina scutulata*, Gld.
Str. Fuca to San Diego.
Many living, bch. Smithsonian coll.

1156 578 *Lacuna porrecta*, Cpr.
Neeah Bay, W. T,, to Monterey.
Santa Cruz, rare living, l. w., 10 dead.

1065 581 *Lacuna solidula*, Loven.
Ounalaska to San Diego—Norway.
2 dead, bch. Sta. Cruz, rare, dead.

1088 583 *Lacuna variegata*, Cpr.
Neeah Bay, W. T., to Monterey.
3 dead, bch. Sta. Cruz, common, l. w.

*682 586 *Isapis fenestrata*, Cpr.
Str. Fuca to San Diego—Ounalaska.
Santa Cruz, rare, dead.

*682a 587 *Isapis obtusa*, Cpr.
Monterey to San Diego.
Monterey? dredged? Carpenter's list, = 586?

*723 588 *Rissoina interfossa*, Cpr.
Monterey to San Diego—deep water.
Rare, dead, dredged? Carpenter's list.

*717 589 *Rissoina purpurea*, Cpr.
Monterey ? Santa Barbara to San Diego.
2 dredged ? dead. Carpenter's list, perhaps distinct.

*430 592 *Rissoa ? Cooperi*, Tryon.
Monterey.
From brackish spring. Carmel only.

*443 595 *Alvania filosa*, Cpr.
Monterey.
"From shell washings." Carpenter's list.

*389 596 *Fenella pupoidea*, Cpr.
Monterey, 20 fms., dead. Catalina I. ?
45 dead, 20 fms.

390 619 *Diala marmorea*, Cpr.
Monterey to San Pedro—Cape St. Lucas.
6 dead, 20 fms. Lives near l. w.

*390a 620 *Diala acuta*, Cpr.
Monterey to Catalina I.
2 dead, 20 fms. Probably = 619 var.

470 624 *Trivia Californiana*, Gray.
Monterey to San Diego and islands.
Many dead, bch. Lives below tides.

467 628 *Erato vitellina*, Hds.
New Year Pt. to San Diego—Margarita Bay.
5 dead, bch. Lives below tides.

395 629 *Erato columbella*, Mke.
Monterey to San Diego—Mazatlan.
5 dead, 20 fms. Lives below tides.

1159 633 *Drillia incisa*, Cpr.
Str. Fuca, W. T., to Santa Cruz, Cal.
Santa Cruz, 2 dead. Lives below tides.

479 635 *Drillia torosa*, Cpr.
Santa Cruz to Santa Barbara.
Many dead, bch. to 10 fms. Taylor disc.

423 645 *Mangelia variegata*, Cpr.
Monterey to San Diego.
1 dead, bch.; 5 living, 5—10 fms. sand.

1253 647 *Mangelia angulata*, Cpr.
Str. Fuca to Santa Barbara.
Santa Cruz, 4 dead.

*425 648 *Mangelia hexagona*, Gabb.
Carmel Bay to Catalina I.
1 dead, bch. Carmel only.

426 655 *Mitromorpha aspera*, Cpr.
Monterey, Cal.
3 dead, bch., 1 living, 7 fms. rock. Taylor disc.

397 656 *Mitromorpha filosa*, Cpr.
Monterey to Santa Barbara.
8 dead, bch. Lives below tides.

482 658 *Conus Californicus*, Hinds.
Farallone Is. to San Diego—Lower Cal.
6 dead, bch. Broken ones not rare.

427 664 *Odostomia gravida*, Gld.
Monterey to San Diego.
1 dead, bch. Possibly another sp.

1254 665 *Odostomia inflata*, Cpr.
Neeah Bay to Farallone Is.
Santa Cruz, 1 dead.

1430 671 *Chemnitzia tridentata*. Cpr.
Str. Fuca to San Pedro.
1 dead, bch. Lives below tides.

428 672 *Chemnitzia chocolata*, Cpr.
Monterey to San Diego.
1 living, dredged. Lives below tides.

428a 673 *Chemnitzia aurantia*, Cpr.
Str. Fuca to Santa Barbara.
1 living, 2 dredged? Lives below tides.

391 674 *Chemnitzia tenuicula*, Gld.
Monterey to San Pedro.
3 dead, 20 fms. Lives below tides.

— 678 *Chemnitzia torquata*, var. *stylina*, Cpr.
Monterey to Santa Barbara.
Monterey? dredged? Carpenter's list.

*1162 680 *Chemnitzia Gabbiana*, Cp.
Mt'y. and Cat. I.? (= *gracillima*, Gabb, not Cpr.)
1 dead (dredged?) Carpenter's list.

459 681 *Chemnitzia*.
Monterey to San Pedro.
1 living 20 fms., 3 dead to 35 fms.

421 683 *Chemnitzia*.
Monterey to Catalina I.
1 living, 7 fms.

386 685 *Eulima micans*, Cpr.
Str. Fuca to San Diego.
2 living, 6 dead, 20 fms. On Asterias.

*386a 687 *Eulima rutila*, Cpr.
Monterey to Catalina I. (= *micans*, var. ?)
1 living, 10 fms.; 9 dead, to 20 fms.

386b 688 *Eulima thersites*, Cpr.
Monterey to Santa Barbara.
1 dead, 20 fms.

928 689 *Scalaria Indianorum*, Cpr.
Str. Fuca to San Diego.
Santa Cruz, common. Living near l. w.

928a 690 *Scalaria Indianorum*, var. ? *tincta*, Cpr.
Santa Cruz to San Diego.
Santa Cruz, common. Living near l. w.

*393 693 *Scalaria subcoronata*, Cpr.
Baulines Bay to San Diego.
2 living, 1 dead, 10 fms.; 2 dead, 20 fms. Lives below tides.

*393a 694 *Scalaria crebricostata*, Cpr.
Monterey to San Diego.
3 dead, 20 fms. Lives below tides.

908 696 *Opalia borealis*, Gld.
Str. Fuca to San Diego—Kamtschatka?
Santa Cruz, rare, dead. Lives near l. w.

*361 699 *Opalia spongiosa*, Cpr.
Monterey; $\frac{1}{3}$ inch long.
1 "shell-washings." Carpenter's list.

323 702 *Cerithiopsis tuberculata*, Mont.
Str. Fuca to Catalina I.—Europe.
1 dead, bch.

826 703 *Cerithiopsis columna*, Cpr.
Str. Fuca to San Diego.
1 dead, bch.; 1 young dredged.

463 709 *Cancellaria Cooperi*, Gabb.
Monterey to San Diego.
1 dead, 16 fms. Not yet found living.

314 712 *Velutina lævigata*, Linn.
Str. Fuca to Monterey—North Atlantic.
1 dead, 2 fms.

335 715 *Lunatia Lewisii*, Gld.
Str. Fuca to San Diego.
Many dead, bch., 4 living, bch. to 3 fms.

†1050 719 *Lamellaria Stearnsiana*, Dall MS.
Santa Cruz to Santa Barbara.
Santa Cruz, 5 living l. w. Variable, and scarcely distinct from *L. perspicua*, Mont., of N. Atlantic.

— 722 *Priene Oregonensis*, Redf.
Str. Fuca to Monterey—Japan.
Canfield coll., bch., dead.

398 725 *Marginella Jewettii*, Cpr.
Monterey to Santa Barbara.
7 dead, bch.; 3 dead, 10—20 fms. Including 727?

398b 727 *Marginella regularis*, Cpr.
Monterey to San Diego.
Monterey? Carpenter's list.

396 728 *Volutella pyriformis*, Cpr.
Monterey to San Diego.
7 dead, 20 fms.

334 730 *Olivella biplicata*, Sby.
Str. Fuca to San Diego.
Many living, l. w. sand.

345 731 *Olivella bœtica*, Cpr.
Str. Fuca to San Diego—Sitka.
Many living, 20 fms. sand. Smithsonian coll.

1076 733 *Olivella intorta*, Cpr.
Baulines Bay to Monterey; Gulf of Cal.?
Santa Cruz, 1 living, many dead, bch. = 730 var.?

487 734 *Nassa fossata*, Gld.
Str. Fuca to San Diego.
1 dead, bch. Rare living.

380 737 *Nassa mendica*, Gld.
Str. Fuca to San Diego—Sitka.
10 dead, bch., many living, 7—20 fms. sand. Live near mouths of streams chiefly.

468 738 *Nassa Cooperi*, Fbs.
Baulines Bay to San Diego.
4 dead, bch.; 8 living, 3—7 fms.; 3 dead, 20 fms. Lives near mouths of streams chiefly.

278 740 *Amycla carinata*, Hds.
Baulines Bay to San Diego.
6 dead. Santa Cruz, common, living near l. w. on kelp.

278a 741 *Amycla carinata*, var.? *Hindsii*, Rve.
Neeah Bay to San Diego.
10 dead. Sta. Cruz, common, living near l. w. on kelp.

383 742 *Amycla gausapata*, Gld.
Str. Fuca to San Diego—Lat. 55° N.
Many dead, 3 living on buoy near shore.

394 744 *Amcyla tuberosa*, Cpr.
Neeah Bay to San Diego.
Many dead, 20 fms. Santa Cruz, living on kelp, l. w.

358 747 *Amphissa corrugata*, Rve.
Str. Fuca to San Diego—Lat. 55° N.
Many dead, bch. Smithsonian coll.

313 751 *Purpura saxicola*, Val.
Str. Fuca to S. Barbara—Ounalaska.
6 living, rocks; 5 dead, l. w. Typical, salt water.

313a 752 *Purpura saxicola*, var. *fuscata*, Fbs.
Str. Fuca to San Pedro, Cal.—Sitka.
2 dead. In water more or less brackish.

313b 753 *Purpura saxicola*, var. *ostrina*, Gld.
Str. Fuca to Santa Barbara.
2 dead. In water more or less brackish.

513 754 *Purpura saxicola*, var. ? *emarginata*, Desh.
Str. Fuca to S. Diego—N. Zealand?
8 living, rocks, l. w. Appears distinct.

282 756 *Monoceros engonatum*, Conr.
Baulines Bay to San Diego.
3 living, rocks, l. w. Common everywhere.

339 758 *Monoceros lapilloides*, Conr.
Monterey to Santa Barbara.
Many living, rocks, l. w.

417 759 *Ocinebra lurida*, Midd.
Str. Fuca to Catalina I.—Sitka.
6 dead, bch.; 1 living, 7 fms. Santa Cruz, more common, dead on bch.

417a 760 *Ocinebra lurida*, var. ? *aspera*, Baird.
Str. Fuca to Baulines Bay—Sitka.
Sta. Cruz, dead, bch. Perhaps distinct.

417b 761 *Ocinebra lurida*, var. *munda*, Cpr.
Str. Fuca to Baulines Bay.

384 763 *Ocinebra interfossa*, Cpr.
Str. Fuca to Monterey—Sitka.
6 dead, bch.; 5 living, 7 fms. Smithsonian coll.

*384b 765 *Ocinebra interfossa*, var. *muricata*, Cp.
Lohitos to Catalina I.
Santo Cruz, common, dead bch. Perhaps distinct.

*384c 766 *Ocinebra interfossa*, var. *clathrata*, Cp.
Santa Cruz to San Diego.
Santa Cruz, rare, dead. Like *Muricidea alveata*.

481 768 *Cerostoma foliatum*, Gmel.
Str. Fuca to Santa Barbara—Asia?
1 living, 4 fms. Bch., common broken.

563 769 *Cerostoma Nuttalii*, Conr.
Baulines Bay to San Diego.
Santa Cruz, 1 dead, bch.

491 772 *Nitidella Gouldii*, Cpr.
Str. Fuca to San Diego.
2 dead, bch. Smithsonian coll.

515 776 *Muricidea squamulifer*, Cpr.
Baulines Bay to San Diego.
3 living, 7 fms. rock. "*Trophon*," Cpr., Sta. Cruz bch., =*Barbarensis ?* Gabb.

411 778 *Trophon multicostatus*, Esch.
Str. Fuca to Monterey—Sitka; Greenland.
1 dead, 20 fms.

419 782 *Siphonalia fuscotincta*, Cpr. ?
Monterey to Catalina I.
4 dead, bch. Possibly the young of others.

— 787 *Fusus ambustus*, Gld.
Santa Barbara to San Diego—Mazatlan.
Smithsonian coll. (=788) ?

956 788 *Fusus geniculus*, Conr. ?
Farallone Is. to Cruz I. (Oregon, *foss.*)
2 dead, bch. (= *ambustus*, var. ?)

418 792 *Anachis penicillata*, Cpr.
Monterey to San Diego.
1 dead, bch. Possibly distinct.

337 794 *Octopus punctatus*, Gabb ?
San Francisco Bay to San Diego—Lower Cal.
1 young, 2 fms. Species doubtful.

### Recapitulation.

| | | |
|---|---|---|
| Species found at Monterey (excluding manifest varieties), | | 197 |
| Species found at Santa Cruz, but not at Monterey in 1861, | | 50 |
| Total found by me in the bay, | | 247 |
| Credited to Monterey by former collectors, but not confirmed, | | 14 |
| New species discovered by me at Monterey, | 30 | |
| New species discovered by me elsewhere, and found in the bay, | 11 | |
| Total, | 41 | |

## NOTES ON RECENT AND FOSSIL SHELLS, WITH DESCRIPTIONS OF NEW SPECIES.

BY T. A. CONRAD.

### MACOMA Leach.

M. SUBROSEA. Pl. 1, fig. 3.

*Description.*—Subtriangular, equilateral, convex; substance very thin; beaks slightly prominent, direct; posterior side cuneiform; ventral margin rounded, disk minutely striated concentrically, white and glossy, with a thin, pale ochreous periostraca; cardinal tooth in the left valve compressed, with a minute linear sulcus.

*Locality.*—Raritan Bay, near South Amboy; Delaware Bay.

This delicate shell was found among the sea weed cast ashore, and all the specimens were dead shells, but with the valves connected by a strong elastic ligament. The shell is more elevated, triangular and equilateral than any other of the small American species.

It has some resemblance in outline to *Macoma fusca*, Say, which accompanies it, but can readily be distinguished by its smaller size, more prominent beaks, shiny and iridescent valves, flexuous posterior side, &c. Specimens from Delaware Bay are larger and rosaceous.

### CYCLOCARDIA.

Prof. Morse, in the Peabody Acad. Report, makes this genus a subgenus under *Actinobolus*, Klein, the type of which is *Cyc. pectinata*. Its nearest affinity is *Venericardia*, Lam.

### CAPULUS, Montf.

C. SHREEVEI, Amer. Journ. Conch., Vol. V, pl. 13, fig. 3.

This supposed species proves to be a tooth of *Pholas costata*. It has a tubular character towards the upper end, which is con-

cealed when in place under the umbo, to which it is attached by the flat incurved side. The breaking of the valve on the beach has freed the tooth in an entire condition, and it has been thought to be an *Aplysia*, which it resembles. The inclosed or tubular part is represented much too long in the figure.

LAGENA, Bolten.

L. TINCTA, Conrad (Pollia.) Proc. Acad. Nat. Sci., vol. iii, p. 25, pl. 1, fig. 9.

*Cretaceous Species.*

ÆORA, Conrad.

*Hinge Character.*—Right valve—three diverging cardinal teeth, posterior one bifid; cardinal plate broad, deeply channelled anteriorly, with a compressed lateral tooth in the middle of the channel; plate deeply channeled posteriorly. Left valve with three diverging cardinal teeth, the anterior one v-shaped, oblique; one distant anterior lateral tooth with a channel above, parallel with the cardinal margin; nympha crenulated on the upper margin; a distant narrow channel on the posterior hinge plate; pallial sinus deep, reaching to a point in a line with the posterior extremity of the posterior cardinal tooth; rounded and somewhat ascending.

This genus is nearly related to the Eocene genus *Isodoma*, Desh. It differs in having three teeth in the right valve instead of two bifid teeth, and in having no lateral tooth posteriorly on the left valve, but a narrow pit in place of a tooth. It has also a much wider hinge plate and a crenulated nympha. The v-shaped tooth on the left valve is a very peculiar and distinctive character.

Æ. CRETACEA, Conrad. Pl. 3, fig. 8.

*Description.*—Subtriangular, subequilateral, convex; end margins acutely rounded; umbo slightly prominent; lunule lanceolate, slightly defined by an impressed line; ventral margin rounded.

*Locality.*—Haddonfield, N. J.

TENEA.

*Hinge Character.*—A v-shaped tooth under the apex of the left valve, the anterior lobe of which is continued along the margin anteriorly, forming a long, deep pit above it; one distant very oblique cardinal tooth posterior to the apex. Right valve—

two cardinal teeth united above; anterior one falcate, with a pit on each side; posterior one curved and directed obliquely backward.

T. PARILIS. Pl. 3, fig. 12.

*Description.*—Suborbicular or subovate, inequilateral, ventricose; umbo prominent; posterior end acutely rounded; ventral margin profoundly curved; surface entire.

*Locality.*—Haddonfield, N. J.

It is thin and fragile, and exteriorly so closely resembles the genus *Mysia* (*Diplodonta*) that I so referred it in the Journal of the Acad. Nat. Sci., vol. vi, pl. 46, fig. 16.

ASTARTE, Sowerby.

A.? STAMINEA, Conrad.

*Description.*—Oval, elevated, inequilateral; beak slightly prominent, acute; disk very minutely and densely striated concentrically; end margins obtusely rounded.

*Locality.*—Ripley Co., Miss.

Journal Acad. Nat. Sci., vol. vi, pl. 46, fig. 8.

TELLIMERA, Conrad.

A more perfect hinge of the left valve of this genus gives the following character: Cardinal teeth two; anterior one v-shaped, nearly direct, or slightly directed anteriorly; the posterior tooth bifid, oblique; posterior lobe thick, and longer than the anterior lobe; cardinal plate comparatively broad laterally, posteriorly channeled; anteriorly with a small pit, apparently for the reception of a lateral tooth.

This genus was originally made a subgenus of *Tellina*, under the name of *Tellinimera*. I have shortened this name in the genus, and in its present form it constitutes a proper name of Greek origin.

T. EBOREA, Conrad. Pl. fig. Journ. Acad. Nat. Sciences, vol. iv, p. 278, pl. 46, fig. 14. Type.

LINEARIA, Conrad.

This genus was described in the Journal of the Acad. Nat. Sciences, vol. vi, p. 279. At that time I had not seen the hinge of the right valve, which has since been obtained in the Haddonfield marl. The hinge shows two small, diverging, nearly equal teeth, directed obliquely forward, the anterior one very oblique;

and two rather long lateral very distinct pits, the posterior one very distant from the apex. The pallial sinus is rounded and extends to a direct line between the apex and ventral margin, according to d'Orbigny's fig. 5, and beyond that point in fig. 17. The present species approaches fig. 5 most nearly in outline, but the radiating lines over the whole disk is a distinguishing character, and the height of the shell is proportionally less.

Pl. 3, fig. 11, represents the hinge of the right valve. From Haddonfield, N. J.

ÆNONA, Conrad.

Equivalved, without fold; hinge character; two compressed, very small, widely diverging teeth in the right valve; lunule very narrow, lanceolate and marked by a deeply impressed line.

Æ. EUFALENSIS, (*Tellina.*) Journ. Acad. Nat. Sci., vol. iv, 2d series, p. 277, pl. 46, fig. 15.

Æ. PAPYRIA, Conrad.

*Description.*—Subelliptical, inequilateral, extremely thin in substance, convex, anterior side narrowed; posterior end obliquely truncated; ventral margin regularly curved; surface marked by microscopic concentric close lines. Length $\frac{5}{8}$ inch.

*Locality.*—Haddonfield.

YOLDIA.

Y. EUFALENSIS, (*Nucula,*) Gabb, Journ. Acad. Nat. Sci., 2d series, pl. 69, fig. 35.

VELEDA, Conrad.

Equivalved. Hinge character; left valve with a v-shaped cardinal tooth under the apex, and three compressed teeth, posterior one elongated and parallel with the dorsal margin, cardinal plate channeled, deeply so anteriorly.

V. LINTEA, Conrad. Journ. Acad. Nat. Sci., vol. iv, pl. 46, fig. 17.

This small bivalve externally very closely resembles the genus *Protocardia*, except in being concentrically striated posterior to the umbonal slope. I referred it to that genus before I saw the hinge.

VENILIA, Morton.

V. ELEVATA, Conrad. Pl. 1, fig. 7, 7a.

Triangular, elevated, profoundly ventricose, with three ele-

vated recurved lamelliform concentric distant ribs on the disk, and two or three small ribs on the umbo; posterior slope wide and flattened or concave, forming a right angle with the disk; umbonal slope terminal.

*Locality.*—Haddonfield, N. J.

I found one valve of this singular species nearly entire.

CARDIUM, Lin.

Subgenus CRIOCARDIUM, Conrad.

Multiradiate; interstices spinose, ribs smooth; anterior lateral tooth long and prominent.

This subgenus presents a singular deviation from the character of recent spinose species, in having long, slender spines in the interstices between the ribs, while the ribs are smooth.

C. DUMOSUM, Conrad.

*Description.*—Cordate equilateral, ventricose; umbo broad; summit very prominent; ribs very numerous, small, closely arranged, convex; interstices furnished with numerous long slender spines; posterior margin subtruncated or slightly convex; height $1\frac{1}{8}$ inch; length the same.

*Locality.*—Haddonfield, N. J.

I am not certain whether or not this is *C. multiradiatum*, Gabb. It has a much broader umbo than *multiradiatum* is represented to have. It also closely resembles *C. Raulineanum*, D'Orb., but is much larger, and proportionally more elevated, and agrees with it in having the spines in the interval between the ribs. The two species, therefore, must be referred to the one subgenus, which appears to be limited to the Cretaceous strata.

SOLYMA, Conrad.

*Hinge character.* Two direct approximate teeth under the apex of right valve. The anterior tooth thick and rounded anteriorly.

*Locality.*—Haddonfield, N. J.

This genus is allied to *Leptosolen*, Conrad, but wants the internal rib of that genus; and differs also in having two teeth in the right valve.

S. LINEOLATUS, Conrad.—Pl. 3, fig. 9.

*Description.*—Equilateral, ventricose, substance very thin; anteriorly slightly contracted, end margin rounded; posterior margin obtusely rounded; umbonal slope rounded; ventral mar-

gin nearly straight in the middle; disk ornamented with minute and very closely arranged lines. Length $1\frac{1}{8}$ in. Height $\frac{3}{4}$ in.

The figure represents the hinge of the right valve. Left valve unknown.

CAMPTONECTES, Agass.

C. BURLINGTONENSIS, Gabb, (*Pecten*).

I have found the shell and sculpture of this species, which prove it to be a *Camptonectes*.

LEPTOMYA, Conrad.

Amer. Journ. Conch. vol. iii, p. 15.

This name having been previously applied by H. and A. Adams to a genus of the family *Tellinidæ*, I substitute the name of *Periplomya*. This genus appears to connect *Anatina* with *Periploma*.

Pl. 3, fig. 10, represents the hinge of left valve and the tooth of the opposite valve.

INOCERAMUS.

*I. peculiaris*, Conrad, Amer. Journ. Conch. vol. v, p. 43, pl. 1, fig. 13. This shell should probably be referred to *Cercomya*, Agassiz.

## VENERIDÆ.

ARTENA, Conrad.

Triangular, thick; surface with acute, concentric, prominent ribs; hinge with three cardinal teeth in the right valve, two of them diverging, distant, the anterior one under the apex, robust, direct, curved; left valve with three diverging distant teeth; lateral tooth very small, pyramidal; pallial sinus very small and angular.

*Cytherea staminea*, Conrad, Miocene Foss., pl. 21, fig. 1.

This genus is readily distinguished from the other genera of the family by one thick anterior tooth in the right valve instead of the two approximate teeth of *Meretrix*, *Caryatis*, &c., and by the two distant, thick, nearly equal teeth of the opposite valve, and also by the very small pallial sinus, the exterior ribs, &c.

The species is triangular, very ventricose, slightly contracted posteriorly, and between the ribs are close, minute, rugose, concentric lines umbonal slope terminal, angular; posterior slope depressed, lunule condate.

A. UNDULATA, Conrad.

*Description.*—Subtriangular, profoundly ventricose; disk un-

dulated slightly and having four thick concentric ribs and numerous prominent lines; inner margin crenulated.

*Locality.*—South Carolina. Cast, in the phosphate deposits. Miocene?

These casts are so well defined that the hinge and external character of the shell can readily be studied by making moulds in wax or plaster.

The ventricose disks, which are common in the hard or coherent phosphate rock, usually show a somewhat undulated surface. The generic character perfectly agrees with that of the preceding. *Venus Lamarckii* is a recent species of this genus.

DOSINIA, Scopoli.

D. OBOVATA, Conrad.

*Dione obovata*, Conrad, Mioc. Foss. 14, 8, 4.

VENUS.

V. (*Circumphalos*) ALVEATA, Say, figured in Say's American Conch. is probably *V.* (*C.*) *athleta*, Con., not *alveata*, Conrad.

*Univalves.*

DENTALIUM?

*? D. hamatus.* Under a lens this cast shows a minute, very closely granulated surface, slightly iridescent. This also appears on a fragment of the inner part of the shell. This character, together with the expanded base, renders it doubtful whether this shell belongs to the family *Dentaliidæ*. I propose to name it *Falcula.*

*D. hamatus*, Conrad, Amer. Journ. Conch. vol. v, p. 44, pl. 1, figs. 12, 16.

CREPIDULA Lam.

C. ROSTRATA, Conrad.

*Description.*—Thin, inflated, umbo very narrow and prominent, beak incurved, pointed above the margin of aperture; diaphragm short, margin slightly concave.

*Locality.*—Virginia. Miocene.

Allied to *C. cymbæformis*, Conrad, but may be distinguished by its thin substance, narrow umbo and incurved apex; while the umbo cavity is solid in the former species, in this it is open to the apex, and the margin of the inner plate is not sinuous as in the former.

C. VIRGINICA, Conrad.

*Description.*—Ovate, thick, inclined to be subfalcate; apex laterally curved; margin about the apex thickened, striated; inner plate long, margin sinuous.

*C. fornicata*, Conrad, not Say.

*Locality.*—Virginia. Miocene.

Very variable from profoundly ventricose to slightly convex. In large specimens the margin behind the apex is very thick. Length two inches.

C. RECURVIROSTRA, Conrad.

*Description.*—Obliquely suboval, profoundly ventricose, posterior side obliquely depressed; anterior side contracted and slightly grooved below the apex, which is subspiral and recurved, but not detached; margin of internal plate sinuous.

*Local.*—N. C.? Miocene.

PERSICULA, Schum.

P. OVULA, Conrad. Miocene Fossils, pl. 49, fig. 9.

*Description.*—Ovate, short, shoulder acutely rounded; callus of labium distinct, subangular, and continued round the upper margin of aperture; mouth rather narrow, slightly widest at base; submargin of labrum minutely crenulated within; plaits eight, upper ones minute, penultimate plait very large.

*Locality.*—James River, Virginia.

MARGINELLA, Lam.

MARGINELLA CONSTRICTA, Emmons.

This Miocene species, bearing the same specific name as a very different Eocene species previously described, I propose to name *Marginella contracta.*

*M. constricta*, Emmons, Geol. of N. C., fig. 135.

Having formerly used the name of *Porcellana*, Adanson, it is necessary to remark, in explanation of my having adopted Lamarck's generic name, that the former having been given by Rumphius to *Cypræa*, Lin., obliges us to restore *Marginella.*

The genus *Erato*, Risso, has not been found in the United States, and therefore the shells I referred to it must be restored to *Marginella.*

The subgenera of *Marginella* cannot successfully be applied to the Eocene species. *Marginella larvata* would be a *Persicula* if it had not an external margin to the larbrum. So would *M. crassilabra*, Conrad, judging by the numerous plaits on the columella alone, but it has a raised spire and very thick margin of labrum. *M. constricta*, Conrad, has five plaits.

# NOTICES AND REVIEWS

OF

# NEW CONCHOLOGICAL WORKS.

BY GEO. W. TRYON, JR.

## I.—AMERICAN.

**Annals of the Lyceum of Natural History of New York.** ix. No. 8. Dec., 1869.

*Additional Notes on the Geographical Distribution of Land Shells in the West Indies.* By THOMAS BLAND.

Contains additions to the list of species given by the author in the seventh volume of the Annals.

*On the names applied to Pisidium, a genus of Corbiculadæ.* By TEMPLE PRIME.

The history of *Physemoda*, Rafinesque, *Galileja*, *Pisum*, Gray (Mühlfeldt), *Musculium*, Link, *Euglesa*, *Pera* and *Cordula*, Leach, are given.

*List of the species of Mollusca found in the vicinity of North Conway, New Hampshire.* By TEMPLE PRIME.

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**Report upon the Oyster Resources of Maryland, to the General Assembly.** By HUNTER DAVIDSON. 8vo, 26 pp. Annapolis, 1870.

The author, who is commanding officer of the State Oyster Police Force, says that oysters are being rapidly exterminated from its waters by immense amount of dredging at periods when the beds are full of young mollusks, which are almost totally de-

stroyed by the heavy dredges. In 1869 five hundred and sixty-three vessels, licensed by the State, dredged and brought to market during the season of seven months upwards of six million bushels of oysters. In addition to this amount, over three million bushels were taken with the "tongs" (for which over nineteen hundred canoes are licensed); making the aggregate yield of the year in the waters of Maryland alone ten million bushels.

A tabular statement of localities aggregates 373 square miles of oyster beds in Maryland.

## II.—FOREIGN.

### BRITISH.

**Annals and Magazine of Natural History.** July, 1869.

*On a new Volute.* By FREDERICK MCCOY.

*Voluta (Amoria) canaliculata. Hab.*—Port Denison.

*Note on the Animal of Limnæa involuta.* By A. G. MORE.

The animal of this species is here described for the first time. The appearance of the shell induced systematists to suspect its intimate relationship with *Amphipeplea*, but the animal is not different from European *Limnæa*.

AUGUST, 1869.

*On the Anatomy of Diplommatina, and its affinity with Cyclophorus and Pupina in the Cyclophoridæ.* By JOHN DENIS MACDONALD.

*On the spire of Voluta Thatcheri.* By FREDERICK MCCOY.

NOV., 1869.

*On some British Fresh-water Shells.* By J. GWYN JEFFREYS.

*Planorbis dilatatus* of Gould is stated to have become a denizen of the Gorton and Bolton Canals at Manchester, its eggs having been transported probably in American cotton.

*Species of Terrestrial Mollusca collected on the Island of San Lucia.* By RALPH TATE.

*Cuttlefish (Sepia) of the Red Sea.* By DR. J. E. GRAY.

**The Journal of Anatomy and Physiology.** Second Series. Vol. iv, No. 5. London. Nov., 1869.

*Sketches to a scale of the Auditory Organs of certain common Molluscs.* By GEORGE GULLIVER, F. R. S., with a plate.

**Journal of the Linnean Society.** Vol. x, No. 44, Nov., 1868, No. 45, Jan., 1869.

*Observations on the Septum of the Cæcidæ, and some remarks on the subject of the suppression of the Genera Brochina and Strebloceras or Phleboceras.* By the Marquis LEOPOLD DE FOLIN. Communicated by W. BAIRD, M.D., F.R.S., &c. With a plate.

The author proposes to suppress the latter genera, and merge the species in the genus *Cæcum*, on the ground of there not being sufficient generic characters to warrant their separation. The following new species are described:

| | |
|---|---|
| *Cæcum formulosum*, | Bahamas. |
| " *decussatum*, | " |
| " *infimum*, | Aspinwall. |
| " *bimamillatum*, | La Guayra. |
| " *carmenense*, | Lagunam de Terminos. |
| " *orientale*, | Mersina. |
| " *auriculatum*, | Palermam. |
| " *strigosum*, | Rio Janeiro. |
| " *vestitum*, | Vera Cruz. |
| " *circumvolutum*, | Aspinwall. |
| " *torquatum*, | Guadaloupe. |
| " *cuccina*, | Vera Cruz. |
| " *Veracruzanum*, | " |

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FRENCH.

**Journal de Conchyliologie.** Vol. xviii, No. 1. 160 pp. 8vo, and 3 plates. Paris, January, 1870.

*Etude sur la mâchoire et l'armature linguale des Cylindrellidæ et de quelques genres voisins sous le rapport conchyliologique.* By H. CROSSE and P. FISCHER.

In this paper an attempt at a classification of the *Cylindrellas* is made based upon the lingual dentition, and those species having jaws are removed from the family and placed in *Helicidæ*. The species thus separated belong to the genera *Eucalodium*, *Berendtia* and *Holospira*, and are essentially Mexican, while the true *Cylindrellas* are principally confined to the West Indies.

The paper is prepared with great care, and will repay study. I cannot agree with its authors in their estimate of the importance of the jaw, and so far from arranging those species having it in another family, I am not even convinced that its presence is of generic value.

*Catalogue des Coquilles terrestres recueillies par les naturalistes de la commission scientifique espagnole sur divers points de l'Amerique méridionale.* By DR. J. G. HIDALGO.

Two hundred species collected in South America are enumerated, with more or less precise localities, and remarks.

*Descriptions d'espèces nouvelles de l'Archipel. Calédonien.* By M. SOUVERBIE and R. P. MONTROUZIER.

*Caledoniella Montrouzieri*, Souv.
*Lambertia Montrouzieri*, "
*Stomatella crassa*, Mont.
*Bulimus Goroensis*, Souv.
*Bulimus submarici*, Souv.
" *Annibal*, "
" *Boulariensis*, Souv.
" *Ouveana*, "

*Note sur l'habitat exact de deux espèces de Coquilles terrestres et de trois espèces de Volutes.* By JOHN BRAZIER.

*Observations sur l'espèces de Coquilles terrestres qui habitent l'île de Kauai (îles Hawaii), accompagnées de descriptions d'espèces nouvelles.* By W. HARPER PEASE.

*Leptachatina*, Gld.
*L. turgidula*, Pse.
*L. costulata*, Pse.
*L. lævis*, Pse.
*L. balteata*, Pse.
*L. tenebrosa*, Pse.
*L. extensa*, Pse.
*L. lucida*, Pse.
*L. antiqua*, Pse.
*Amastra sphærica*, Pse.
" *rugulosa*, Pse.
*Catinella rubida*, Pse.
*Succinea elongata*, Pse.

*Descriptions d'espèces nouvelles.* By H. CROSSE.

*Voluta Hamillei*,
*Murex Pazi*,
*Helix ancylochila*,
" *abrochroa*,
" *cyrene*,
" *cymodoce*,
*Bulimus Corydon*,
" *Aristæus*,
*Pupa gubernatoria*,
*Truncatella Arcasiana*,
*Ostrea Pauluccie*.

*Faune malacologique terrestre et fluviatile des îles Viti, d'après les envois de Dr. E. Graeffe.* By ALBERT MOUSSON. (Fourth Memoir.)

*Nanina fragillima*,
" *nodulata*,
" *excrescens*,
*Zonites plicostriatus*,
*Patula subdædala*,
" *inermis*,
" *adposita*,
*Stenogyra novemgyrata*,
*Tornatellina columellaris*,
*Physa gibberula*,
*Auricula intuscarinata*,
*Melampus avenaceus*,
*Trochomorpha accurata*.

*Diagnoses Molluscorum Novæ Caledonie incolarum.* By H. Crosse.

*Helix Gentilsiana,* *Bulimus Pancheri,*
" *Goulardiana,* *Microtina Heckeliana.*

*Description d'un Helix inédit provenant de la Nouvelle-Calèdonie.* By E. Marie.

*Helix Abax,* Marie.

*Diagnoses d'espèces inédites provenant de la Nouvelle-Calédonie.* By J. B. Gassies.

*Succinea Paulucciæ,* *Helicina mediana,*
*Helix subcoacta,* *Planorbis Fouqueti,*
" *Melitæ,* *Melanopsis curta,*
" *Deplanchesi,* " *Zonites,*
*Bulimus buccalis,* " *robusta,*
" *Ouensis,* " *fusca,*
" *Pinicola,* " *fusiformis,*
" *Theobaldianus,* " *Souverbieana,*
*Scarabus Maurulus,* *Neritina morosa,*
" *Crosseanus,* " *Paulucciana,*
*Cyclostoma Vieillardi,* " *Lenormandi,*
*Helicina Gallina,* *Navicella excelsa.*

*Bibliographie. Necrologie. Nouvelles.*

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**Revue et Magasin de Zoologie.** No 8, Paris, 1869.

*Descriptions de quelques Paludinidées, Assiminidées et Mélanidées nouvelles.* By Dr. Paladilhe. (Continued.)

*Belgrandia Bigorrieneis,* n. sp. Pyrennees.
" *gibberula,* " France.
*Hydrobia Paludestrinoides,* " Pyrennees.
" *peracuta,* " Lyons, France, Nyons, Switzerland.
*Paludestrina procerula,* " France and Spain.
" *pachygastra,* " Sicily.

No. 9. 1869.

*Description dune espece nouvelle de Cyprœa.* By Dr. F. Jousseaume.

*Cyprœa Ambryana,* Guadaloupe.

No. 10. 1869.

*Descriptions de quelques Paludinidées, Assiminidées et Mélanidées nouvelles.* By M. Paladilhe. (Continued.)

*Assiminea obeliscus.* Algiers.
*Lartetia Bourguignati.* Jura, France.
*Lartetia Moussoniana.* " "

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GERMAN.

**Baron Carl Claus von der Decken's Reisen in Ost-Afrika.** 3d volume: Quadrupeds, Birds, Reptiles, Crustaceans, Mollusks and Echinoderms. 8vo. Leipzig and Heidelberg, 1869.

The chapter on mollusca is by Dr. E. Von Martens, and includes the following new species:

*Helicarion aureofuscus,* *Nanina*, var. *albopicta.*
*Nanina pyramidea,* *Buliminus rhodotœnia,*
" *Mossambicensis,* *Physa Seychellana,*

The illustrations consist of three lithographic plates.

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**Novitates Conchologicæ.** Supplement III. Monographie der Molluskengattung Venus, Linné. By Dr. Edward Römer. 20th and 21st Parts, with 6 colored plates. Oct., 1869.

This issue completes the monography of *Circe.* The new species are:

*C. speciosa,* Philippines. *C. lirata,* China.

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**Novitates Conchologicæ.** Supplement IV. Japanische Meeres-Conchylien. A contribution to the knowledge of the Mollusca of Japan, with various reflections upon their geographical distribution. By Dr. C. E. Lischke. Parts 5—8, with 7 colored plates. 1869.

This important work is now completed. There are no species first described in the present issue, but many interesting observations are made on synonymy.

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**Systematisches Conchylien-Cabinet of Martini and Chemnitz.** (2d Edition.) 194th Part. 4to. Nürnberg, 1869.

Contains the commencement of a monograph of *Donacidæ,* by Dr. Edward Römer.

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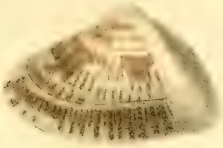
**Bijdragen tot de Dierkunde.** Published by the Society Natura Artis Magistra of Amsterdam. 1869.

*Catalogue des Coquilles de la famille des Conidés, qui se trouvent au Musée de la Societie Zoologique d'Amsterdam.* By A. Oltmans.

This rich collection is catalogued alphabetically, and embraces 230 species and numerous varieties.



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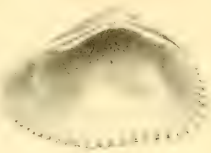

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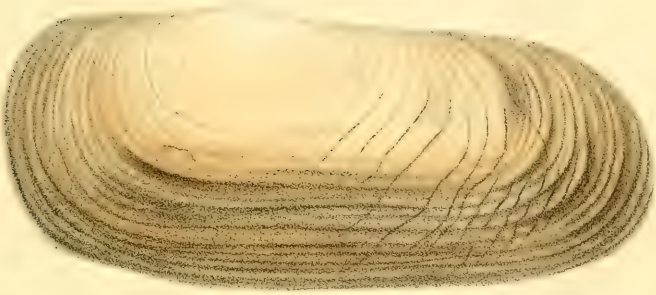

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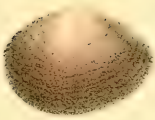

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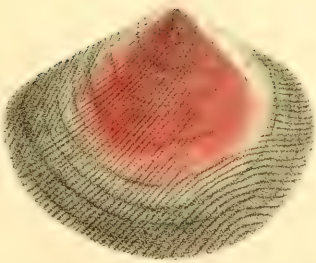

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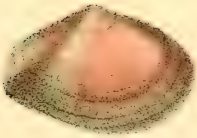

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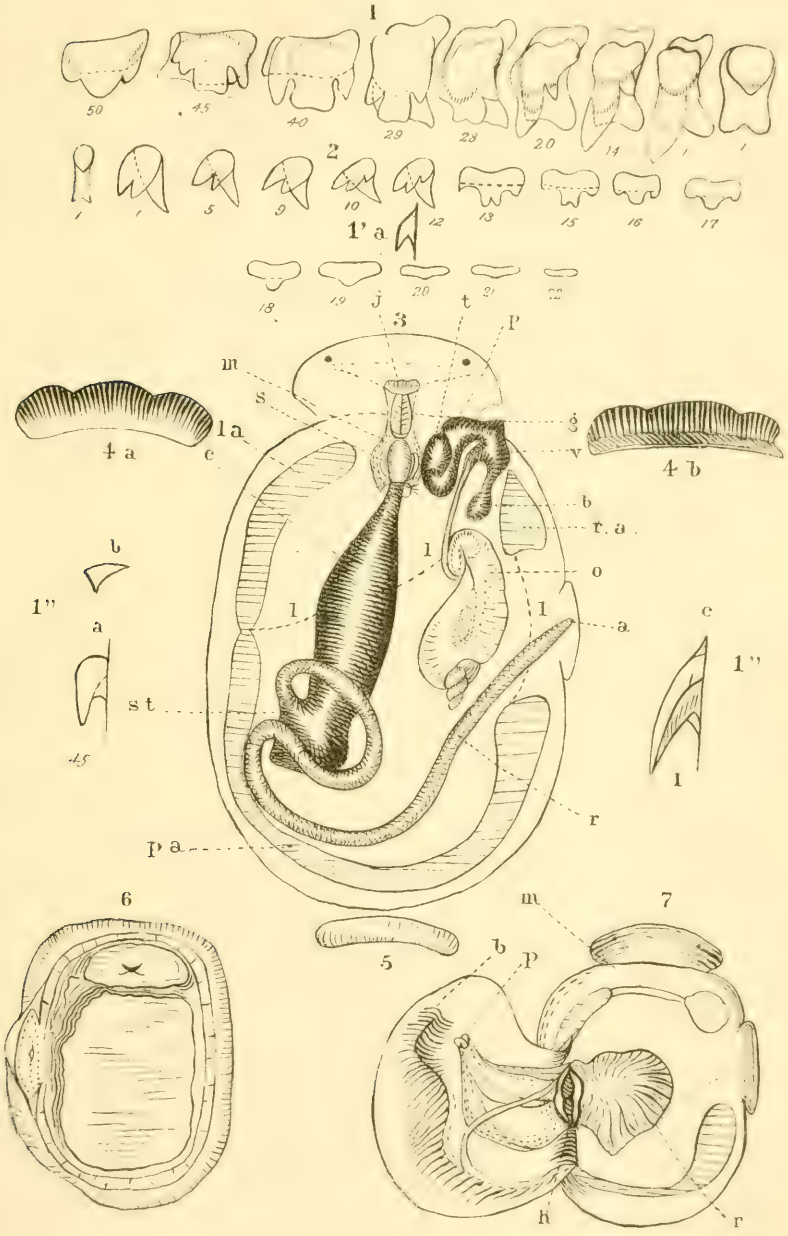
Tryon, On new Marine Bivalves.

*Dall, On Gadiniidae*

W. H. DALL, FROM NATURE

Pease, Fresh Water Shells of Sandwich Islands.
Conrad, On New Fossil Mollusca




*Dall, On Siphonaria*

# AMERICAN
# JOURNAL OF CONCHOLOGY.

NEW SERIES.

PUBLISHED BY THE

CONCHOLOGICAL SECTION of the Academy of Natural Sciences of Philadelphia

VOL. VI. 1870–71. PART 2.


*Meeting April 7th*, 1870.

Seven members present.

DR. W. S. W. RUSCHENBERGER, Director, in the Chair.

A number of additions to the Library and Museum were announced.

The following paper was offered for publication, and referred to a Committee:

"Monograph of the Fluviatile Mollusca of the United States. Part 4th (completing the work);" by Geo. W. Tryon, Jr.

Mr. Tryon read a communication from the family of Guiseppe Stabile, of Milan, late a Correspondent of this Section, announcing his decease.

The following communication was read, and directed to be printed in the Journal:

*Mohawk, N. Y., April 2d*, 1870.

To DR. JOS. LEIDY:

It will be remembered that those writers who have spoken of the *soft parts* of certain of our species of *Lymnæa* have been unable to point out any differences that would aid the student in discriminating. My own observations, so far as they relate to the group that embraces the forms to which have been given the

names *elodes*, *catascopium*, *emarginata*, *fragilis*, &c., seem thus far to add nothing to the observations of others. In fact, the *soft parts* of all these are too slightly varied to admit of a suspicion of specific difference. We are left then to consider the forms and appearances of the shells; and those for any of the *supposed* species referred to above exhibit a succession of variations that blend the whole mass into one. The presence or absence of ferruginous or other coloring matter determines the *color* of the shell in a remarkable degree. The temperature of the water determines the mode of development of the shell in a very obvious manner; abundance or scarcity of food will determine in a remarkable manner the *size* of the soft parts, and of course that of the enclosing shell. Whether the whorls of a shell be regularly and symmetrically rounded, or on the other hand assume a *malleated* appearance, as if little plane facets had been formed on a soft convex surface by hammering, is *not* a specific character. It depends upon the *rapidity* of the growth of the *soft parts*, and whether there be at the same time a sufficient amount of calcareous matter in the food of the mollusc to give the shell a sufficient solidity not to yield to the external influences by which the mollusc is surrounded.

I have often taken *L. elodes* while in rapid growth, and found the margins of the shells so thin and fragile that the slightest handling would fracture them. In all such cases the appearance of the surface of the shell is of the character called "*malleated*." We do not often find this appearance in those shells we call *catascopium*, for the reason that the shells so called are generally found in bodies of water of very equal temperature, often rapidly moving; food is also less abundant, and the growth of the soft parts is not so rapid but that the whorls of the shell retain their rotund form. It may be suggested, then, that the following differences in station account for the supposed species that probably are in reality only one:

An equable temperature, a moderate supply of food, limited supply of air, and frequent disturbances of the station of the animal by currents in the water, determines the form we call *catascopium*.

A warmer station, abundance of food, unlimited access to the atmosphere, and quiet stagnant water, favor the development called *elodes*.

In the instances I have referred to in my papers in the Proceedings of the Bost. Soc. Nat. Hist. and in the Amer. Jour. Conch., the eggs of *catascopium* were developed as *elodes* by being transferred to a *shallow stream*, where they found favoring conditions in the rich confervoid vegetation growing in the inter-

stices of a coarse gravel, a warm station in little pools of quiet water along the margin of the stream, free access to the air, by their proximity to the surface of the water, always within reach.

If you regard these remarks of sufficient importance, please make use of them in any way that will promote the objects of those who seek truth.

Respectfully yours,

JAMES LEWIS.

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*Meeting May 5th*, 1870.

Nine members present.

MR. TRYON, Vice-Director, in the Chair.

Several donations to the Library and Museum were reported.

The following papers were offered for publication in the Journal:

"Revision of the Terebratulidæ and Lingulidæ;" by Wm. H. Dall.

"'Notes on Lingual Dentition' by W. G. Binney and Thos. Bland;" Review by Wm. H. Dall.

"Rectification of the Synonymy of certain Species of Marginella;" by John H. Redfield.

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*Meeting June 2d*, 1870.

DR. RUSCHENBERGER, Director, in the Chair.

The two following papers were offered for publication, and referred to Committees:

"Catalogue of the Recent Species of the Family Melanidæ;" by Aug. Brot, M.D.

"Notices and Reviews of New Conchological Works;" by Geo. W. Tryon, Jr.

A letter was read from Prof. M. McDonald, of the Virginia Military Institute, at Lexington, Va., reporting the occurrence there of living *Helicina occulta*, Say, in immense quantities. The species was supposed to be extinct until discovered two or three years since by Prof. McDonald. It has also occurred, rarely, at Milwaukie, Wisconsin. Individuals were found by Prof. McD. upon the stems and leaves of plants in some cases at an elevation of two to three feet above the surface of the ground.

## A REVISION OF THE TEREBRATULIDÆ AND LINGULIDÆ, WITH REMARKS ON AND DESCRIPTIONS OF SOME RECENT FORMS.

BY W. H. DALL, SMITHSONIAN INSTITUTION.

In the preparation of this paper I have been much indebted to the Smithsonian Institution, under the direction of Prof. Joseph Henry, for the use of its collection of recent Brachiopoda, and for the use of the cuts which illustrate the text of this article. I am under great obligations to Mr. F. B. Meek, of the Smithsonian Institution, for assistance, especially in regard to the fossil forms; his knowledge of the latter being only equalled by his kindness in imparting it.

I am also indebted to Thos. Davidson, Esq., F.G.S., &c., for much useful information and assistance, and for his unfailing courtesy in correspondence.

I have derived much assistance from the works of Messrs. Suess, Deslongchamps, Hall, King and Davidson, and especially from the admirable plates which accompany the excellent monographs of the last-named learned palæontologist.

The fact that I have departed from the arrangement hitherto in general use, is due to the belief that the practice of combining under one name forms differing in structure as well as detail, is detrimental to the interests of science. With few exceptions, the forms which I have separated sectionally, or generically, have been accurately figured and described by other authors; yet, in order to refer to them specially, the student must make a special study of all the forms, and search through paragraphs and pages relating to other forms which have been united with those of which he desires information; a course which, though popular from the greater latitude which it allows to the careless and superficial observer, is yet reprehensible, as destructive of the care and accuracy in detail which are so greatly needed in the study of recent as well as fossil forms.

The great interest which attaches to the theory of evolution renders close discrimination all the more valuable at the present

day, whether the opinions of the observer incline to accept or to reject it.

Again, the whole system of nomenclature is only useful as an index to the members of the animal kingdom. The more accurate, full, and discriminating the index, the greater its value in generalization, and the more accessible becomes a true appreciation of natural laws. On the other hand, the combining in unnatural and heterogeneous groups, for purposes of convenience, forms which exhibit structural differences of greater value than the characters of the united group, is a course directly in opposition to all principles of science, and one which lays the greatest obstacles in the path of study. The argument used against an extended nomenclature, of its overtaxing the memory, &c., as Dr. Mörch truly observes, is unworthy a moment's consideration from scientific minds, and is only adapted for the non-scientific and popular masses. Such a train of reasoning carried to its logical conclusion would take us back to the system of Linnæus, or Aristotle himself.

In these remarks I must not be understood as reflecting in any way upon the very valuable labors of the authors above mentioned. To Mr. Davidson we are under great obligations, for restraining the premature *cacoëthes nominandi* in the group of *Brachiopoda*. However, I believe the time has arrived when our knowledge of the internal structure of these mollusks is sufficient to warrant their separation into natural groups, which should no longer be left without definite appellations.

The position of the *Brachiopoda* with respect to the other classes of the animal kingdom has been frequently the subject of discussion, but of late years naturalists have almost unanimously agreed in considering them as closely allied to the *Ascidians* and *Polyzoa*, and as occupying a place in that subdivision of the subkingdom Mollusca of Cuvier, to which the name *Molluscoidea* has been applied. The researches of Mr. E. S. Morse into the embryology of *Terebratulina septentrionalis*, would seem to substantiate this view entirely, and the only question still undecided would seem to be whether the *Brachiopoda* or the *Ascidia* should be considered as the most nearly allied to the *Lamellibranchiata*. As naturalists have generally come to the conclusion that linear classification is impossible, this point, though of interest, can hardly be said to be of great importance. But, more recently, Mr. Morse,* after enjoying great facilities for the study of the living animal of *Lingula*, has announced as his opinion, that the Brachiopods and Polyzoa must be removed from the mollusca

* Silliman's Journal, July, 1870, p. 100.

including the Ascidians, and that the former are, as he expresses it, "true articulates and not mollusks, and that their proper place is among the worms, forming a group near the tubicolous Annelids."

A statement at once so startling and so utterly at variance with the received ideas upon the subject, naturally awakens a sentiment of opposition; such being the case, we should endeavor to use the utmost impartiality in discussion, and to give due consideration to the facts bearing upon either side of the question. It is, I believe, generally admitted that, in classifying forms which lie upon the boundaries of the great subdivisions so closely as to render their position a matter of doubt, a conclusion is more fairly reached by considering the sum total of the characters than by an exclusive classification based upon any one of them; and also that in arriving at a decision a comprehensive view of the general types of structure is more reliable than minor morphological considerations. Taking this view of the case, we may judge more clearly of the value of Mr. Morse's proposition by comparing the general structure of the Mollusca with that of the Annelids and then deciding from the facts, to which of them the structure of the Brachiopods and Polyzoa offers the greatest affinity.

Clark has shown very clearly* that the mollusca as a group are characterized especially by a bilateral development of single organs, that is, "among the zoophytes and articulates we find an excess of repetitions, of multiplicity of parts; but here (among the mollusca) every part or organ is single or in a single pair, and, instead of repeating itself, it develops its uniformity to relatively extreme proportions."

The main characters of the mollusca are as follows:

The *circulatory system* varies in extent, the ascidians possessing a simple unilocular contractile vesicle and incomplete vascular apparatus, while the cephalopod developes a trilocular heart with a distinct arterial and venous system. The heart, when it exists, is usually on the opposite side of the alimentary tube, from the principal nervous centre. The blood is colorless or colored.†

The *nervous system* essentially consists of a collar of nerves and ganglia around the oval opening or anterior portion of the alimentary tube. The principal nerve-mass is usually on the opposite side from the heart.

The *alimentary system* consists essentially of a tube invariably

* Mind in Nature, 1865, p. 195.

† Colored blood has been observed in *Chiton;* in *Tunicata* by Milne Edwards; the circulating fluid of *Hirudites* is of a deep wine-color.

more or less bent upon itself, and in most cases with the excurrent orifice adjacent to the incurrent or oral opening.

The muscles of *Salpa* abound in transversely striated fibres While among the mollusca transverse bands of muscular fibre are not uncommon, yet these never enclose a succession of similar nervous, vascular or reproductive organs; nor do they include the whole body except in some *Tunicates*. The majority of the mollusca possess a calcareous shell, secreted by an organ called the mantle, to which they are permanently attached by strong muscles, and from which they cannot emerge and live. Our knowledge of their embryology is too limited to admit of sweeping generalizations.

Chitine is very generally secreted by them in the form of teeth, jaws, byssus, bristles* or opercula.

On the part of the Articulates, and especially the Annelids, their most strongly marked and typical feature is that of a repetition of similar parts; "we find it equally conspicuous among the internal organs, the intestines, heart, lungs or gills, nervous system and the reproductive system," "the highest of them do not attain to that singleness of character which exists even in the lower middle ranks of mollusca."†

Their principal structural characters are as follows:

The *circulatory system* is highly developed, complete and closed. The place of a heart is supplied by several large contractile vessels,‡ or by the contraction of the vascular channels or of the body itself.§ The vessels anastomose at both extremities, and by transverse vessels in the separate segments. The blood is colored or colorless.

The *nervous system* is composed of two cords which connect successive ganglia, or, instead, send off lateral branches at regular intervals, along the median line of the body, while the most anterior and principal ganglion lies above the œsophagus.‖

The digestive apparatus almost without exception opens by a mouth at the anterior end of the body and terminates by an anus at the posterior end. It is usually straight, rarely having convolutions and frequently divided by muscular constrictions into many sections.

The muscles of the Annelids, though highly developed, appear

*The bristles of *Chiton* are well known, in *Acanthochites* especially they are gathered in regular bundles, in follicles, corresponding to the segments of the shell, while in *Cryptochiton* they are spread over the entire surface.

† Mind in Nature, p. 214.

‡ Siebold. Anat. Inv., p. 167, et seq. Burnett's translation.

§ In the *Nemertoida*.

‖ Siebold, p. 156-60.

without notable exception to be destitute of transverse striations.*

The whole body is enveloped by subcutaneous muscular layers; (1) of transverse muscles; (2) of longitudinal muscles, and in many forms a third, of obliquely twisted fibres, is interposed between the two.

Such of the Annelids as possess a shelly covering form it by a secretion from a collar which surrounds the anterior extremity, which either deposits a calcareous matter or a fluid which serves to agglutinate grains of sand or other substances together to form a tube. But in no case are the inhabitants provided with permanent muscular attachments to such tubes; they can emerge without injury, especially when young,† and form another habitation without inconvenience. The shells of Annelids are always univalve, and no Annelid is known to attach itself by a byssus or by a portion of its integument, to any extraneous object.

In the Brachiopods and Polyzoa we find the following details of structure: while it is noteworthy that they are formed on the plan of uniformity, characteristic of the mollusca, and exhibit no trace of the reduplication of similar parts, which is the most salient feature of the Annelids and articulates in general. There is no vascular system or heart in the *Polyzoa*. The heart in the *Brachiopoda* is indistinct and the circulation is incomplete, recalling a similar condition of things among the ascidians. Two or four accessory, contractile vesicles assist in propelling the blood. They are distinct from the blood vessels, in which the circulation is assisted by ciliary action. The blood is colored as in *Chiton* and many Ascidians. The nervous system in the *Polyzoa* consists principally of a ganglion placed between the afferent and efferent openings as in Ascidians. In the Brachiopods it is more highly developed and consists of a series of ganglia and nerves, forming a collar surrounding the œsophagus "as in all true mollusks," with the greater portion of the ganglia below the œsophagus, while in worms it is above it.

The digestive canal is bent upon itself in both *Polyzoa* and *Brachiopoda*, without exception. This is doubtfully reported, as far as I know, of but one worm, a larval form (*Phoronis*); other characters of this Annelid will presently be mentioned. In some of the Brachiopods the canal is closed, while in others it opens laterally. It is never divided into sections by muscular constrictions as in worms.

* Siebold, l. c. p. 154. But one or two species of Annelids have been asserted to have striated muscular fibres.

† Johnstone, Cat. Brit. Nonparasitical worms, pp. 1 & 81.

The muscles of the *Polyzoa* are not striated; in arrangement they strongly recall those of *Salpa*. On the other hand the muscles of many of the Brachiopods are notable for their very conspicuous and remarkable striation.

The peduncle of *Lingula anatina* consists of four layers; an outer horny layer, imperforate and smooth, or slightly villous under a very high power, and transversely wrinkled by contraction into irregular annulations: second, a gelatinous, homogeneous layer of pellucid matter, probably of the same essential character as the outer layer, but softer; third, a very thin, delicate single layer of transverse muscular fibres ("delicate membrane," of Hancock) the most worm-like of all the characters of the group in question. But an exact parallel to the three layers just described may be found in the siphons of Lamellibranchs (for instance *Mya arenaria*) though the fourth layer, which in the Brachiopods is composed of simple longitudinal muscular fibres, is, in the other group, modified for the special use for which it is designed.* A similar arrangement of circular muscles is found in the higher Ascidians.

Finally, we find one special character worthy of mention upon which Mr. Morse has laid much stress, namely, the "bristles" which fringe the mantle-edge in most of the brachiopods, and which he has found "identical" with the setæ of worms.

These "bristles" or cirri in the brachiopods are very peculiar, and unlike anything reported by all writers on worms, accessible to me. They emerge one or two, or rarely more, from follicles on the edge of the mantle, exactly as we find the bristles of *Acanthochites* doing among the chitons. The bristles of *Plaxiphora*, however, are not homologous, being more accurately regarded as dermal prolongations. But, while seated in follicles, as among Chitons, the cirri of the brachiopods are less like Chiton-setæ than the latter are like worm-bristles. The last-mentioned are solid,† usually falciform, rarely jointed, and of homogeneous consistency, quite insoluble in boiling caustic potash. They are sometimes serrated, and often provided with a hook; and in the tubicolous Annelids are repeated with every segment. The Chiton-setæ resemble them in being solid, and homogeneous, but they are more simple in form, shorter, and in some species strengthened with a limy deposit.

*It is not impossible that, to some extent, the peduncle may be analogous to the siphon; especially as in Müller's figure of an embryonic *Discina*, a little organ below the mouth (which Morse compares with an Annelidan operculum) seems from its position, at least, to be analogous with the "foot" of bivalves, while the peduncle occupies relatively the same position that the siphon would.

†See Johnstone, loc. cit. p. 79, et. seq.

The cirri of the brachiopods are tubular and composed of two layers. The inner one is composed of slender, brittle, longitudinal fibres of chitine; the outer is membranous, very thin and regularly imbricated, the imbrications perhaps indicating stages of growth. In *Lingula anatina* and *Discina lamellosa* these bristles are covered with small short pointed *setellæ*, irregularly disposed upon the surface. These setellæ resemble the thorns upon a rose bush, being larger at the base, but the portion of membrane upon which they are seated is sometimes constricted below the base, giving them a pedunculated appearance. They are not articulated however as they might appear at first sight.

Some of the cirri are flattened a little and the transverse imbrications are closer than in some others. This may be due to differences in rapidity of growth.

When the cirri are boiled in caustic potash the outer membrane, *setellæ*, and most of the imbrications disappear entirely. Nothing remains but the chitinous tube, which, deprived of its envelope, splits readily into longitudinal fibres, or collapses.

When the difference in their construction and the fact that they are confined to the mantle edge and are not found upon the peduncle or other parts of the body, are recognized, it becomes very evident that they are by no means "identical" with the setæ of the worms.

The brachiopods are invariably attached by permanent muscles to bivalve shells, while the Annelids have no muscular connection with their univalve tubes of mud or sand. The fact that *Lingula pyramidata* forms a "sand-tube" about the peduncle, though interesting, has no bearing on the subject, since it is obvious that it cannot be formed in the same manner as the worm-tube, with which it might be compared, and does not bear the same relation to the animal.

The brachiopods are, as a rule, pedunculated and usually attached by their peduncles to submarine objects; *Lingula* forms no exception; though non-attached individuals are abundant, others of the same species are permanently fixed to stones or shells.

None of the Annelids are pedunculated nor attached by the integument to submarine objects. *Phoronis* and *Crepina*, larval Sipunculoid worms, which have been relied upon to bridge the chasm between the *Polyzoa* and the *Annelida*, have a distinct arterial and venous system, the latter, certainly, and the former, probably, have a straight intestine terminating in a posterior anus,* and in fact if the crown of ciliated tentacles be hidden,

*See Strethill Wright, pp. 314–316, (Ed. new Philosoph. Journ. Vol. iv, 1856,) and compare Johnstone loc. cit. p. 266.

the sight, in the words of Van Beneden, the describer of *Crepina*, and a well known student of the Annelids and *Polyzoa*, is enough "to drive the very idea of a Polyzoön far away" !*

To conclude, it is impossible to avoid the impression that in hastily referring the Brachiopods and Polyzoa to the Annelids, Mr. Morse has judged the case on inadequate grounds, and from the evidence before us it is not unsafe to predict that they will remain in the future as in the past, unmolested among the Molluscoidea, with their nearest allies the Tunicates.

The recent observations of M. E. Deslongchamps on the spiculæ contained in the mantle and circulatory system of most of the genera, go far toward proving the erroneous nature of the homologies which have been drawn between the calcareous supports of *Thecidium* and the apophyses of other forms of *Brachiopoda*. This is elsewhere discussed.

I have preferred using the terms neural and hæmal to indicate the different valves, rather than the appellations ventral and dorsal, which can hardly be applied to the shells of this group. I have considered the pedunculated extremity of the shell as the posterior, and the opposite end as the anterior portions of the mollusk.

In the details of the apophyses, I have used terms whose meaning is sufficiently evident; dividing them into the *crura*, *hæmal processes*, *neural processes*, *lateral loops*, *neural loop*, *septal processes*, *lateral processes*, *septum*, &c., according to their relative position with regard to the shell, as will readily be understood.

The nomenclature of the figures is essentially the same as that of Woodward's Manual, in which most of them originally appeared.

As no list of the recent species of *Rhynchonella* has been lately published, I have added one, with appropriate references, for the convenience of students.

* Van Beneden, "*Notice sur un Annelid*," &c., Bull. de l'Ac. Royale de Belgique, 2d Series, V, 1858, p. 457.

Note.—I would add, that so far as I have carried my dissections of *Lingula anatina*, the results obtained agree entirely with those of Mr Hancock, in his magnificent paper on the organization of the Brachiopoda; which stands unsurpassed in the annals of the comparative anatomy of invertebrates; and, while some of the surmises put forth in it have not been confirmed by further researches, yet in the laborious accuracy of the dissections it may ever serve as a model to students.

*Synopsis of characters.*

*TEREBRATULIDÆ.*—Punctate, foraminated, pedunculate, valves articulated. Brachiferous, with non-spiral apophyses.

TEREBRATULINÆ.—Hæmal valve bearing a simple loop, attached only to the hinge margin; provided with crura.

TEREBRATULA.—Loop simple, crura separated.

*Terebratula.*—Shell ovate. Brachia behind the mouth, provided with two lateral and a median spiral lobe.

*Centronella.*—Mesial sinuation of the loop prolonged neurally, as a thin lamina.

*? Epithyris.*—Hinge plate pointed, prolonged beneath the loop.

*Pygope.*—Shell bilobed when young; lobes uniting and leaving a central perforation, in the adult.

RENSSELÆRIA.—Hinge plate perforate internally. Anterior part of the loop pointed before, wider behind, long, with a slender process neurally perpendicular to the posterior edge.

TEREBRATULINA.—Loop with the tips of the crura united forming a more or less sinuous ring.

WALDHEIMIA.—Loop elongated and reflected, crura separated.

*Cryptonella.*—Loop with a transverse band uniting the apophyses behind the crura.

*Waldheimia*—Ovate, inflated; crura short, cardinal process and border moderate.

*Meganteris.*—Orbicular, compressed, nearly equivalve. Crura long, projecting over the edge of the reflected loop. Cardinal process and border, large.

STRINGOCEPHALINÆ.—Cardinal process produced and bifid. Loop not reflected, submarginal; attached to the crura by their neural edges (?); both valves with a septum.

STRINGOCEPHALUS.—Loop provided with thin processes converging internally. Neural septum fitting into the bifurcation of the cardinal process. Foramen very large, triangular, when young; round and small when adult.

MAGASINÆ.—Loop reflected, attached both to the hinge-line and to a hæmal septum.

TEREBRATELLA.—Apophyses with their hæmal arms connected with the septum by two septal processes.

*Trigonosemus.*—Area large, flat; beak produced; foramen minute, apical.

*Lyra.*—Beak much produced, divided internally by the prolongations of the dental laminæ.

*Terebratella.*—Shell usually ovate. Brachia with two lateral lobes meeting behind the mouth, median lobe absent, or obsolete. Septum not prominent, posterior neural loop free.

*Laqueus.*—Shell ovate, foramen usually entire, posterior neural loop attached on each side by slender processes to the hæmal processes, near the attachment of the septal processes.

*Kingena.*—Posterior part of the neural loop broad, angulated, with the corners brought down and attached to the septum. Exterior rough or pustulate.

*Ismenia.*—Lateral loops and neural loop broad, and blended posteriorly with the hæmal and septal processes, forming a broad funnel-shaped ring; lateral loops anteriorly open. Exterior as in *Terebratella.*

MEGERLEA.—Apophyses as in *Ismenia*, but lateral loops closed with calcareous matter. Shell transverse, hinge-line straight; striate outside, pustulate inside. Median brachial spiral lobe prominent. Brachia passing behind the mouth.

MAGAS.—Apophyses attached by the sides of the hæmal processes to the septum.

*Magas.*—Reflected portion of the loop incomplete.

*Magasella.*—Reflected portion of the loop complete.

KRAUSSININÆ.—No loop. Apophyses comprising two laterally extended lamellæ attached to the upper part of the prominent mesial septum of the hæmal valve.

KRAUSSINA.—Shell externally sculptured, beak truncate; foramen large, incomplete; septal lamellæ anteriorly inclined. Mouth behind the brachia, mesial spiral lobe minute.

BOUCHARDIA.—Shell externally smooth, beak produced; foramen minute, complete; septal lamellæ posteriorly inclined.

PLATIDIINÆ.—Brachia sigmoid, meeting behind the mouth; no spiral lobe.

PLATIDIA.—Loop simple, not reflected; attached to a mesial septum. No cardinal process. Foramen encroaching on both valves.

MEGATHYRINÆ.—Mouth central, surrounded by a membranous disk, bounded by non-spiral submarginal brachia.

MEGATHYRIS.—Hinge-line straight; loop not reflected, submarginal, attached. Mantle adherent to the shell.

*Megathyris.*—Foramen and area large. Shell sculptured. Loop attached to three or more submarginal radiating septa.

*Cistella.*—Shell smooth or sculptured. Loop attached to a single submarginal mesial septum, which interrupts the brachia.

* * * *

? THECIDIINÆ.—Shell attached by the substance of the neural valve, and with the foramen closed when adult. Young with a minute apical foramen. Loop entirely absent. Mantle supporting the brachia (which are non-spiral and irregularly lobed), and itself supported by a self-secreted irregular calcareous network.

THECIDIUM.—Shell thick, oval, rounded. Area large and flat. Crura united in a bridge over the visceral cavity. Brachia usually separated by a mesial ridge and its branches. Calcareous network variable.

NOTE.—*Eichwaldia*, Bill, which is doubtfully referred by Bronn to the *Terebratulidæ*, is founded on a shell (*E. subtrigonalis*, Rep. Prog. Can. Sur. p. 192, 1858) of which the internal structure is unknown, but which resembles externally, in the position of the foramen and general appearance, *Magasella Cumingii*, Davidson, sp., P. Z. S. 1852, pl. xiv, fig. 10—16. The genus was published in the Rep. on the progress of the Canadian Geol. Survey, 1858, p. 192, fig. 24, a to e, and the type is from the Coal Measures of Canada.

*Leptocœlia*, Hall, is closely related to *Atrypa*.

*Hynniphoria*, Suess, is unknown to me.

*Tropidoleptus* has been referred doubtfully, by Prof. Hall, to the *Terebratulidæ*. The type is *Strophomena carinata*, Conr. I do not feel sufficiently confident of its true position to admit it at present. The apophyses appear to resemble a *Magas*, without the upper reflected portion.

*Vitulina*, Hall, is somewhat undecided in its relations; *V. pustulosa*, Hall, is the type.—*Vide* Pal. N. Y., vol. iv.

## Table of Classification.

*Those genera or species only found fossil, are in italics.*

| FAMILY. | SUBFAMILY OR SECTION. | GENUS. | SUBGENUS. | TYPE. |
|---|---|---|---|---|
| Terebratulidæ. | Terebratulinæ. | Terebratula. | Terebratula. | *T. maxillata.* |
| | | | *Centronella.* | *C. glans-fagea.* |
| | | | *? Epithyris.* | *E. elongata.* |
| | | | *Pygope.* | *P. diphya.* |
| | | | *Rensselæria.* | *R. ovoides.* |
| | | | Terebratulina. | T. caputserpentis. |
| | | | Waldheimia. | W. flavescens. |
| | | | | *C. rectirostra.* |
| | | | *Meganteris.* | *M. Archiaci.* |
| | *Stringocephalinæ.* | *Stringocephalus.* | | *S. Burtini.* |
| | Magasinæ. | Terebratella. | *Trigonosemus.* | *T. elegans.* |
| | | | *? Lyra.* | *L. Meadii.* |
| | | | Terebratella. | T. dorsata. |
| | | | Laqueus. | L. californicus. |
| | | | *Kingena.* | *K. lima.* |

| FAMILY. | SUBFAMILY OR SECTION. | GENUS. | SUBGENUS. | TYPE. |
|---|---|---|---|---|
| Terebratulidæ. | Magasinæ. | Terebratella. | Ismenia. | *I. pectunculus.* |
| | | Megerlea. | | M. truncata. |
| | | Magas. | Magas. | *M. pumila.* |
| | | | Magasella. | M. Evansii. |
| | Kraussininæ. | Kraussina. | | K. rubra. |
| | | Bouchardia. | | B. tulipa. |
| ? | Platidiinæ. | Platidia. | | P. anomioides. |
| | Megathyrinæ. | Megathyris. | Megathyris. | M. decollata. |
| | | | Cistella. | C. cuneata. |
| ? | ? Thecidiinæ. | Thecidium. | | *T. pumilum.* |
| * | * | * | * | * |
| Lingulidæ. | Lingulinæ. | Lingula. | | L. anatina. |
| | | Glottidia. | | G. albida. |
| | | *Lingulella.* | | *L. Davisii.* |
| | | *Trimerella.* | | *T. grandis.* |
| | | *Lingulepis.* | | *L. pinnæformis.* |
| | *Obolinæ.* | *Obolus.* | | *O. apollinis.* |
| | | *Obolella.* | *Obolella.* | *O. chromatica.* |
| | | | *Kutorgina.* | *K. cingulata.* |
| | | *Monobolina.* | | *M. plumbea.* |
| | | *Spondylobus.* | | *S. craniolaris.* |
| | | ? | | *? polita.* |

## Family *TEREBRATULIDÆ.*

Shell punctate. Neural valve perforated at or near the apex, and attached to submarine objects by a peduncle passing through the perforation, or by a portion of the valve itself; provided with two teeth, which are articulated into sockets in the hæmal valve, which, in its turn, possesses a more or less prominent (cardinal) process which interlocks with the neural valve.

Animal with ciliated brachia more or less provided with non-spiral calcareous supports, which proceed from the hæmal valve.

### Section TEREBRATULINÆ.

Hæmal valve with a simple loop proceeding from the hinge margin, more or less sinuate, and possessing two pointed processes or crura which have their origin near the hinge margin, to which alone the loop is attached. Deltidium composed of two pieces, often united.

#### Genus TEREBRATULA (Llhwyd), Auct.

Shell provided with a simple sinuous loop. Crura separated. Neural valve perforate at or near its extremity; attached by a pedicel.

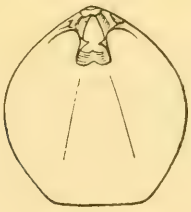


Fig. 1.

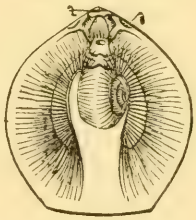


Fig. 2.

Fig. 1. *Terebratula vitrea*, Born, hæmal valve.
Fig. 2. Same, with the animal.

#### Subgenus TEREBRATULA (Llhwyd), Auct.

Shell ovate, margin entire. Brachia passing behind the mouth, provided with two symmetrical lateral lobes and a double spiral median lobe.

*Type.* *Terebratula maxillata*, Sby., Min. Conch. p. 52, pl. 436, f. 4, 1822, =

*T. minor subrubra*, Llhwyd, Lith. Brit. Ichn. 1699, pl. xi, fig. 890.

The genus *Terebratula* of Llhwyd, who was not a binomial author, was adopted by Müller (Prodr. Zool. Dan. 1776, pp. xxxi and 249), although not in the restricted sense in which it is at present employed. His *Terebratulæ* embraced several species now distributed in different genera. In 1799, Lamarck, in his Prodr. Nouv. Class. des Coquilles, adopted the name, taking *T. perovalis*, Sby., as his type. This example has been followed by almost all subsequent authors. The generic term *Anomia* used for species of this family by Bolten (1798), Linnæus, and other authors, has in modern times, with equal unanimity been applied to a genus of Lamellibranchiate mollusca.

The type most commonly cited for the genus is the recent *Terebratula vitrea* of Born (= *Anomia terebratula*, Lin. Syst. Nat. 1153, and *Gryphus vitreus*, Megerle, Berl. Mag. 1811, p. 64), which inhabits the Mediterranean and is found fossil in the Pliocene deposits of Sicily.

TEREBRATULA UNGUICULA, Cpr.

*T. unguicula*, Cpr., Proc. Zool. Soc. Feb. 14, 1865, figs. 1 to 4, p. 201. Cooper, Geogr. Cat. of Cal. Mollusca, p. 3, No. 3.

*Hab.* San Diego, 6 fm.; Monterey, 20 fm., Cooper. Vancouver Id., Forbes. Sitka, under stones at low water: Unga Id., 4 fms., Dall.

This remarkable and very distinct species is provided in the young state with strong, radiating, simple ribs, and in this condition the hæmal valve resembles, exteriorly, a small *Pecten*. In older specimens the ribs bifurcate and become less pronounced, and the resemblance to a young *Terebratulina caput-serpentis* becomes more marked. The principal differences are that the *Terebratula* is rather the wider, and the intercostal spaces are more channelled than in the *Terebratulina*. Even these differences may not be constant in a large number of specimens. The broad incomplete loop, of course, is abundantly sufficient to identify this species. The umbo of the neural valves is sharply pointed in perfect specimens; the foramen is large and incomplete, the area smooth and very short; there is no deltidium, and the pedicel is usually stout and short.

Smithsonian Cabinet, 14,789, 14,892, 15,264.

No. 16,232, a single valve from Neeah Bay, appears to be *Terebratella caurina*, Gould, jun., worn.

### Subgenus CENTRONELLA, Bill.

*Centronella*, Billings, Can. Nat. iv. 1859, p. 131. A. J. Sci. vol. 36, p. 237.

Shell resembling *Terebratula*, but with the mesial sinuation of the loop prolonged toward the neural valve, in the shape of a thin lamina.

*Type.* *Centronella glans-fagea* (Hall sp.). Bill., in Can. Nat. 1859, p. 131, fig. 1 to 5, and Am. Journ. Sci. xxxvi, p. 237, fig. 8.

Fossil in the Devonian of Canada. Plate vi, fig. 8.

### ? Subgenus EPITHYRIS, King.

*Epithyris*, King (not Phillips), Perm. Foss. p. 146. 1850.
*Seminula*, M'Coy, Br. Pal. Foss. 1855 (not = *Seminula*, M'Coy, 1844).
*Dielasma*, King, Proc. Dub. Univ. Zool. and Bot. Assoc. vol. i, 1859, p. 260.

Shell with lamellæ supporting the teeth of the neural valve, a short loop as in *Terebratula*, but more abruptly sinuated anteriorly, and with the central lamina of the hinge plate, in the hæmal valve, produced in the form of a mason's trowel, and supported beneath by a mesial septum.

*Type.* *Epithyris elongata*, King, = *Terebratulites elongatus*, Schloth. Fossil, Permian. Plate viii, fig. 7, after Davidson.

Mr. Davidson's figure in the Permian Brachiopoda represents the hinge lamina as produced almost as far as the loop, and very prominent; those of Prof. King in the Permian Foss. show little more than may be observed in various species of different genera in this family. If the last-named figures be correct, the group is hardly of subgeneric value.

*Epithyris* of Phillips (Pal. Foss. 1841, p. 55) was not sufficiently characterized, and no type was mentioned. Hence the name was still available, as it represented nothing. Prof. King applied it to this species and others allied to it, naming and figuring the species above mentioned as his type. In 1844 Prof. M'Coy had given the name *Seminula* to a group belonging to the

*Helictobrachiata*, composed of an *Athyris* and two species of *Rhynchonella*. This fell to the ground, and in 1855 he proposed to apply the name to the group already characterized by King as *Epithyris*.

Under the impression that his early name was inadmissible, Prof. King again described the group, with the same type, under the name of *Dielasma*.

According to the strictest rules of nomenclature *Epithyris* must take the precedence, and *Dielasma* be considered as a synonym.

Subgenus Pygope, Link.

*Pygope*, Link, Physik. Erdbeschr. ii, 1830. King, Perm. Foss. p. 144, 1850. Woodw., Man. Rec. and Foss. Shells, p. 215, pl. xv, fig. 2.

*Antinomia*, Catullo, Quart. Journ. Geol. Soc. vol. vii, 1850, p. 74.

Loop as in *Terebratula*. Shell punctate. Young bilobed, the emargination being in the median line. In the adult the inner edges of the valves unite, leaving a circular perforation in the centre of the shell.

*Type*. *Pygope diphya*, = *Terebratula diphya*, v. Buch, Ueb. Ter. p. 88, pl. 1, fig. 12.

Fossil in Jurassic beds of Europe.

The very remarkable conformation of the adult shell cannot have been without some corresponding differences in the soft parts, and is sufficient to entitle the group to subgeneric rank, although the apophyses resemble *Terebratula*.

Another species, *P. diphyoides*, d'Orb. (Pal. Fran. Ter. Cret. iv, p. 87, pl. 109), is found in the Neocomian of France.

The recent species of the genus *Terebratula*, not previously mentioned, are:

*Terebratula uva*, Brod., P. Z. S. 1833, p. 124. Hab., Gulf of Tehuantepec, Cuming; Falkland Ids., Davidson.

*? Terebratula minor*, Phil. and Suess., Dav. Ann. Nat. Hist. 1861, p. 35. Hab., Mediterranean.

*Terebratula Davidsoni*, A. Adams, P. Z. S. 1867, p. 314, pl. 19, fig. 30. Satanomosaki, Japan, 55 fathoms.

*?? Terebratula transversa*, Gould, Proc. Bost. Soc. Nat. Hist. vol. vii, p. 323, Sept., 1860. Otia Conch., p. 120. Dav., Ann. Nat. Hist. 1861, p. 38. (Not *T. transversa*, Sby., which is a synonym of *T. dorsata*, Lam.) Suess. Wohns. i, p. 27, 1859.

The type of this species is not to be found, and I am unable to suggest its proper place from Dr. Gould's description. Suess (l. c.) refers it to *Meyerlea*. Hab., Hakodadi Bay, Japan.

*Terebratula cubensis*, Pourt., Bull. Mus. Comp. Zool. No. 7, p. 109. W. Indies.

Genus RENSSELÆRIA, Hall.

*Atrypa*, Conrad, Ann. Rep. Geol. of New York, 1839, p. 45.
*Pentamerus*, Vanuxem, Journ. Phil. Ac. Nat. Sci. viii, p. 266, 1843.
*Meganteris*, Hall, An. Rep. Reg. Univ. N. Y. Pal. Foss, 1857.
*Rensselæria*, Hall, 12th An. Rep. Reg. Univ. N. Y. p. 39, Oct. 1859.

Shell punctate, inequivalve; neural valve with a prominent apex; foramen complete or incomplete, terminal, sometimes concealed. Teeth supported by receding plates, which are attached in the cavity of the apex of the neural valve; septum present.

Haemal valve with a more or less prominent hinge plate and cardinal process. The hinge plate is perforated near the apex of the valve, forming a communication with the cavity of the umbo.

Two moderately stout processes are given out from the hinge upon which the crura are attached at a strong angle, projecting above and below, and at the lower extremity giving off the main branches of the apophyses about at a right angle. The latter are produced anteriorly, meeting, and forming a sharp point connected by a thin plate of shelly matter, at the posterior edge of which, in the median line, a slender process is projected upward, nearly parallel with the crura, toward the neural valve.

*Type. Rensselæria ovoides*, Hall = *Terebratula ovoides*, Eaton, Geol. Textb. 1832, p. 45.

Fossil in the Lower and Upper Helderberg and Oriskany beds of New York.

Prof. Hall has aptly compared a view of the apophyses with the tongue of a bird having the hyoid bones attached.

Genus TEREBRATULINA, D'Orb.

*Terebratulina*, D'Orb., Comptes Rendus xxv, p. 268, 1847.

Shell with the foramen incomplete and deltidium usually rudimentary. Crura united at their tips in the adult, forming a more or less sinuous ring.

Brachia as in *Terebratula*.

*Type.* *Terebratulina caput serpentis.* L. sp.

*Anomia caput serpentis*, Linn., Syst. Nat. ed. 12, 1153, 1767.
*Terebratulina caput serpentis*, D'Orb., Ann. Sci. Nat. viii, 67, pl. vii, fig. 7, 8, 17, 1848.
*Terebratulina cornea*, D'Orb., 1848.
*Terebratula pubescens*, Retz., N. Gen. 15.
*Anomia retusa*, Linn., S. N. 12, p. 1151.
*Delthyris spatula*, Mke., Syn. ed. 2, 96.
*Terebratula aurita*, Flem., Phil. Zool.
*Terebratula costata*, Lowe, Zool. Journ.
*Terebratula striata*, Leach, Br. Moll.
*Terebratula Gervillei*, S. Wood, Mag. N. H. v, p. 253.

*Hab.* North and East Atlantic. Smithsonian Cabinet, 14, 187.

Fig. 3.

Fig. 4.

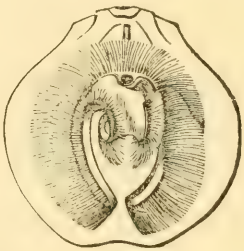


Fig. 3. *Terebratulina caputserpentis*, D'Orb., hæmal valve.
Fig. 4. Same, showing the animal.

This species, by the coarser and rougher striæ, and usually more elongate and less inflated valves, seems sufficiently distinguished from *T. septentrionalis*, Couth.

It is reported from Japan, by A. Adams. Perhaps his specimens may have been *T. augusta*, Ad. (= *T. Japonica*, Sby. teste Rve.), or possibly *Terebratula unguicula*, Cpr.

The other recent species of this genus are:

*Terebratulina Japonica*, Sby., Thes. Conch. vii, p. 344, pl. 68, fig. 7, 8. Hab. Japan.

*? Terebratulina Cumingii*, Dav., P. Z. S. 1852, p. 79, pl. xiv, fig. 17, 18, 19. Hab. China Seas, Japan.

*Terebratulina abyssicola*, Ad. and Rve., Voy. Samarang, Moll. p. 72, pl. xxi, fig. 5. Hab. Gulf of Corea.

*Terebratulina radiata*, Rve., Conch. Icon. pl. iii, fig. 7 a, 7 b. Hab. Gulf of Corea, Belcher.

*Terebratulina cancellata*, Koch, Kuster Conchyl. Cab. v, vii, pl. ii b, fig. 11 and 15. Hab., West Australia, Suess.

*Terebratulina Caillettii*, Crosse, Journ. de Conchyl. 1865, p. 27, pl. i, fig. 1, 2, 3. Hab. West Indies.

Genus WALDHEIMIA, King.

*Waldheimia*, King, Perm. Foss. p. 81, 1850.
*Macandrevia*, King, Proc. Dub. Univer. Zool. and Bot. Assoc. 1859, p. 261.
*Eudesia*, King, Perm. Foss. p. 144.
*Lampas*, Humph. (pars.)
*? Rynchora*, Dalm. (pars.)
*Waldheimia*, Woodw., Gray, Dav. and the generality of authors.

Loop elongated and reflected, without secondary attachments.

Fig. 5.

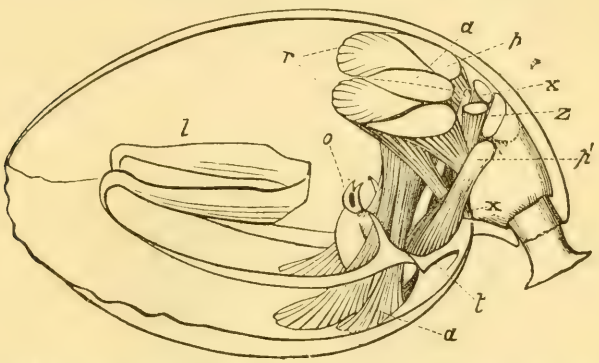



Fig. 5. Muscular system of *Waldheimia*. $\frac{2}{1}$ nat. size, after Hancock. *a*, *a*, adductors; *r*, cardinals; *x*, accessory cardinals; *p*, *p'*, *z*, pedicel muscles; *o*, mouth; *l*, apophyses; *t*, dental socket.

Subgenus CRYPTONELLA, Hall.

Loop exactly resembling that of *Waldheimia*, proper, except in the addition of a transverse band from one side of the apophyses to the other, behind the crura.

*Cryptonella*, Hall, 14th Rep. Reg. Univ. N. Y. 1861, p. 102, 20th Rep. 1867, p. 20, 21. Pal. N. Y. vol. iv. pp. 392, 393.

Type, *Terebratula rectirostra*, Hall. Fossil in the Devonian of New York.

This genus has hitherto been confounded with *Centronella*, Billings, from which it would now appear to be quite different.

Subgenus WALDHEIMIA.

Shell globose, neural beak more or less produced; foramen complete or incomplete. Deltidia separated or united; pedunculated; a ridge or septum usually existing in the hæmal valve.

Mouth behind the brachia, which consist of two lateral lobes and a central spiral lobe.

Fig. 6. Fig. 7.

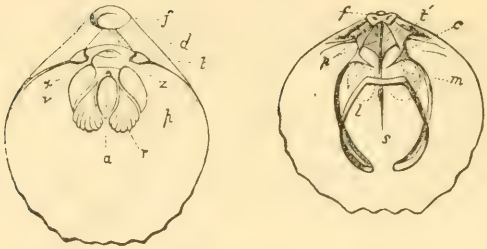
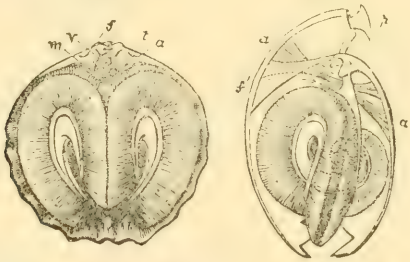



Fig. 6. Neural valve of *Waldheimia flavescens*. *f*, foramen ; *t*, teeth ; *d*, deltidium ; *a*, single adductor scar ; *r*, cardinal muscle scar ; *x*, accessory muscle scar ; *p*, pedicel muscle scar ; *z*, pedicel attachment.

Fig. 7. Hæmal valve of the same. *j*, cardinal process ; *t'*, dental sockets ; *p*, hinge plate ; *s*, septum ; *c*, crura ; *l*, neural loop ; *m*, adductor scars.

Fig. 8. Fig. 9.




Figs. 8 and 9. Side and neural views of the animal of *Waldheimia flavescens* in the shell.

*Type.* *Waldheimia flavescens.*

*T. flavescens*, Val. apud Lam., Anim. sans Vert. v, vii, p. 330. Rve., Conch. Iconica, pl. i and pl. ii a, b.

*Terebratula dentata*, Val.

*Terebratula australis*, Q. and G.

*Terebratula recurva*, Q. and G.

*Waldheimia australis*, King, Mon. Perm. Foss. p. 145. Davids. Int. Br. Foss. Brach. p. 65, pl. vi, fig. 9, 10.

*Hab.* Australia. Smithsonian Cab. 17814.

Most of the specimens of this species are radiately ribbed; some, however, are quite smooth, especially the smaller specimens.

In the latter the foramen is barely complete. There are considerable variations in the amount of inflation, and the form varies from ovate to transverse.

WALDHEIMIA VENOSA, Sol. Plate viii, fig. 8 and 11.

*Anomia venosa*, Sol. MSS. Mus. Banks. Dixon's Voy. p. 355, pl. xi, 1788. Dav., Ann. and Mag. Nat. Hist. xx, p. 81—83.

*Terebratula globosa*, Lam., An. s. Vert. v, vii, p. 330. Rve., Conch. Icon. pl. ii. fig. 3 a, b, c, pl. vi, fig. 3 d, e. Jour. de Conchyl. 1861, p. 122.

*Terebratula californica*, Sby., Auct. (non Koch).

*Waldheimia dilatata*, Lam., Rve., Conch. Ic. pl. ii, fig. 2, pl. vi, fig. 2 b, 2 c.

*Terebratula Gaudichaudi*, Blainville (teste Rve).

*Waldheimia physema*, Val., Rve., Conch. Ic. vi, fig. 25 a, b, c.

*Terebratula eximia*, Philippi (teste Rve.)

*Terebratula Kochii*, Kust., Conch. Cab.

*Terebratula Fontaineana*, D'Orb., Voy. Am. Mer. v. p. 675, No. 782; ix, pl. 85, fiig. 30, 31.

*Hab.* Orange Harbor, Tierra del Fuego. U. S. Ex. Ex. Smithsonian Cabinet, 17,813.

Of the shells submitted to Mr. Reeve for examination, collected by the U. S. Exploring Expedition, fifteen specimens were returned by him under this name. Externally they presented no differences among themselves except in size and coloration. An examination of the apophyses showed that, of the whole number of specimens, three belonged to a different genus, while ten retained no remains of the apophyses. The latter, probably, and the two perfect specimens, certainly, were correctly determined.

This shell does not agree with Sowerby's description as given in the Br. Mus. Cat. p. 59.

In all the specimens examined except one the foramen was complete; in that one a slight fissure existed, seemingly the result of erosion. This character, however, is by no means to be relied upon, as it is not constant in many of the species.

The apophyses are very slender and narrow, a breath almost being sufficient to destroy them. The cardinal process is very prominent, and terminates in two rounded knobs.

The beautiful red, vein-like markings, present in most of the specimens, are simply the remains of the ovaria. They are entirely composed of animal matter, and may be washed entirely away with water. Hence they cannot be relied upon as a diagnostic, though much more permanent than the remainder of the animal matter.

The form of the shell varies from elongate oval to nearly circular, with or without an anterior flexure.

WALDHEIMIA CRANIUM, Mull.

*Terebratula cranium*, Mull., Prod. Zool. Dan. p. 209. Rve., Conch. Icon. pl iii, fig. 6. Journ. de Conchyl. 1861, p. 123. Jeffreys, Brit. Conch. ii, p. 11, v, p. 163.
*Terebratula vitrea*, Flem. (non Born.)
*Terebratula subvitrea*, Leach (teste Rve.)
*Terebratula glabra*, Leach, Brit. Moll. p. 359, pl. xiv, fig. 3, 4, 5.
*Macandrevia cranium*, King.

*Hab.*—Norway, McAndrew, Smithsonian Cab., 13,979.

The foramen of this species is incomplete, and the area very small. The loop is deeply reflected and of extreme tenuity. The shells vary in their different stages of growth from lenticular to ovate globose.

Prof. King, whose perception of differences of structure is remarkably keen, separated this species from *Waldheimia*, under the name of *Macandrevia*, on account of the absence of the septum and flat central lamina of the hinge plate, in the hæmal valve, and the want of the laminæ which support the teeth, in the neural valve of the typical species, as well as the incomplete foramen.

I have shown elsewhere in this paper that the foramen may be complete or incomplete in the same species, that the dental laminæ of the neural valve may also be present or absent in the same species (e. g. *Laqueus suffusus*), that the mesial septum may be found in some species of a genus and not in others, that in some species the dental laminæ may be absent in the neural valve while the central lamina of the hinge plate is still to be found in the hæmal valve (e. g. *W. Raphaelis*) and, therefore, I cannot consider the structure in question as of even subgeneric value.*

WALDHEIMIA GRAYI, Dav.

*W. Grayi*, Dav., Proc. Zool. Soc. 1852, p. 76, pl. xiv, fig. 1, 2, 3. Rve., Conch. Iconica pl. ii, fig. 5, a, b, c. Journ. de Conchyl. 1861, p. 123. Cpr., Suppl. Rep. Br. Assoc. 1863, p. 636. Cooper, Geogr. Cat. Moll. 1867, p. 3.

*Hab.* Catalina Id., Coop. Corea, Belcher. Monterey, Dall. Smithsonian Cabinet, 401, Cp.; 1651.

This a good deal resembles *Kraussina capensis* externally.

The red bands of color in this fine species are sometimes absent. In such cases it is impossible to distinguish it from varie-

* Mr. W. G. Binney (Inv. Mass. 2d ed. p. 211), has placed this species in the family *Rhynchonellidæ*!!

ties of *Terebratella caurina*, Gld., except by the apophyses, which are not attached, and by the absence of a septum. The foramen is usually larger in this species, in proportion to the size of the shell, and the hinge line usually more curved, but these differences are inconstant. The deltidia in the largest specimen are firmly united, in three or four others they are widely separated. The blood of this species is red.

This species has been termed *Eudesia Grayi* by some authors, but as the plaits, which were the characters upon which the genus *Eudesia* (type *Wald. cardium*, Val.,) was founded, are inconstant characters and by no means of generic value, I cannot consider the plaited species as sufficiently distinct to deserve separation from the other species of the genus.

WALDHEIMIA RAPHAELIS, n. s. Plate vii, fig. a, b, c, d.

*Hab.* Japanese coast near Yeddo, R. Pumpelly. Smithsonian Cabinet, 11786.

Shell ovate, truncate anteriorly; beak recurved, produced, somewhat pointed. Foramen complete, moderate; area large, ill defined; deltidia united, moderate. Neural valve smooth, obsoletely marked with lines of growth. Anterior edge doubly emarginate, with the median portion somewhat produced; with corresponding median emargination and double lateral prolongation of the anterior margin of the hæmal valve. The lateral margins of both are nearly straight.

The hinge-line is greatly arched; there are no plate-like dental supports; the shape of the muscular impressions on the neural valve is best shown by the figure. They are proportionately smaller than in *W. flavescens*.

The hinge plate of the hæmal valve is broad and somewhat excavated between the median line and the hinge teeth. The plate forms a triangular table, so to speak, which lies flat on the posterior part of the septum. The cardinal process is rhomboidal and stout. The loop is very broad in the reflected portion; the crura are slender, sharply pointed, and strongly curved at the tips. The septum is about half as long as the valve.

The color of the shell is a somewhat deep brown with a slight rufous tinge. Externally the valves are conspicuously and regularly punctate. The punctures are of an oval shape outside, and smaller, more distant, and circular within.

This species differs widely from all described recent forms. It is named in honor of the collector, Prof. Raphael Pumpelly, the indefatigable geologist, who has added so much to our knowledge of Japan.

The other recent species of this group are :

*Waldheimia lenticularis*, Desh., Mag. Zool. 1841, pl. xli. *Hab.* Strait of Fauveau, New Zealand.

*Waldheimia picta*, Chemn., Sby. Thes. Conch. vii, p. 351, pl. 70, fig. 43, 44. *Hab.* Java, Japan.

*Waldheimia septigera*, Lovèn, Index Moll. Scandin, 1846, p. 29. *Hab.* Norway; Japan.

*Waldheimia floridana*, Pourt., Bull. Mus. Comp. Zool. No. 7, p. 127. *Hab.* West Indies; Florida coast.

Subgenus MEGANTERIS, Suess.

*Meganteris*, Suess., (not Hall) Sitz. Ak. Wiss. Klas. Math. xviii, 1856, p. 51, pl. i, figs. 1, 2, 3, 5, 16 and pl. iii, figs. 3 a, 3 b, (*M. Archiaci*).

Shell orbiculate, somewhat compressed, nearly equivalve. Area of neural valve small, apex inconspicuous, minutely foraminated, punctate. Deltidia small, wide, united. Cardinal process prominent, with a V-shaped process near the apex for the insertion of the cardinal muscles, sulcated on each side, with the base excavated. Cardinal border broad, wide, rugose. Loop essentially as in *Waldheimia*, but with very long crura, the main stems of the apophyses being given off at a sharp angle with the crura, reflected abruptly and the posterior part of the reflected loop behind and below the crura. There is a faint mesial septum in the hæmal valve.

Type *Meganteris archiaci*, Suess. Plate viii, fig. 12, 12a. Fossil in the Devonian of the Eisel.

? Section STRINGOCEPHALINÆ, Dav.

*Stringocephalidæ*, Dav., 1851, Int. Brit. Brach. p. 73. Loop attached to the crura by their neural edges ?

Genus STRINGOCEPHALUS.

*Stringocephalus*, Dav., (emend) Int. Brit. Brach. p. 73, 1851.
*Strigocephalus*, Defr. Dict. Hist. Nat. Vol. li, p. 102, pl. 75, fig. 1, 1a, 1827.

Fig. 10.

Fig. 10. Young shell, $\frac{4}{1}$ nat. size. *h*, hinge area; *b*, deltidium; *p*, pseudo-deltidium.

Animal unknown, pedunculated. Foramen large, triangular

in the young; small and oval in the adult; deltidium composed of three elements. Neural valve with a pointed apex and a well developed septum. Hæmal valve with a very prominent cardinal process, forked at the extremity (to receive the edge of the neural septum), provided with a mesial septum. The lower portion of the hinge plate supports the crura of the loop in the shape of two flattened lamellæ, which, after proceeding with a slight upward curve to near the extremity of the septum, are suddenly reflected and again approach the sockets before sweeping submarginally around in the form of a large wide loop, from the inner edge of which a number of smaller lamellæ branch off and converge.

Fig. 11. Fig. 12.

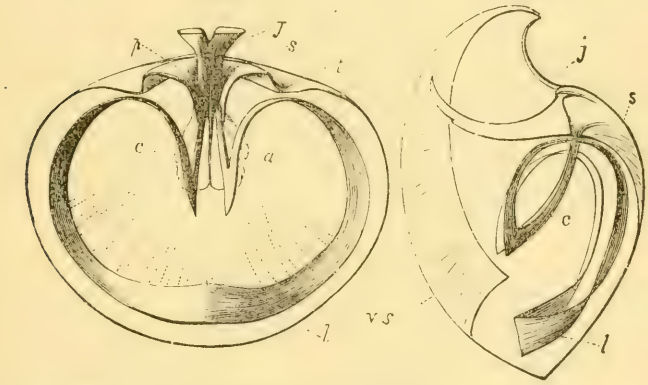



Fig. 11. Hæmal valve of *Stringocephalus Burtini*.
Fig. 12. Profile of shell of same. *a*, adductor scar; *j*, cardinal process; *p*, hinge plate; *s*, hæmal septum; *vs*, neural septum; *t*, dental sockets.

Type *Stringocephalus Burtini*, Defr., Woodw. Man. Rec. and Foss. Shells p. 222, figs. 130, 131, pl. xv, fig. 13.

With regard to the position of this genus in the arrangement, I must dissent entirely from the opinion of M. Suess., who places it in the vicinity of *Megathyris*.

The reflection of the apophyses from the neural edge of the crura (if correctly restored) is a remarkable feature, and the most casual examination of the loop of *Megathyris* will show that it is totally different, the reflection in the last named genus being from the outer and *hæmal* side of the crura, as in all the other genera of the *Terebratulidæ*, which possess a loop. The lamellæ, which have occasionally been noted on the inner edge of the loop of *Megathyris* are features of the most trivial nature, and analogous instances are found in other species belonging to totally different genera, for instance *Terebratella pectunculus*,

Schloth., Dav. An. of Nat. Hist. 1850, pl. xv, figs. 5, a, b. The structure of *Stringocephalus*, while sufficiently distinct to deserve a section to itself, is most nearly allied to that of the septate *Waldheimias*, near which I have placed it.

*Stringocephalus*, according to Mr. Davidson, has only been found in strata of the Devonian age.

Messrs. White and St. John have provisionally indicated a new form under the name of *Cryptacanthia*, (Trans. Chicago Acad. Sci., i. p. 119, 1868,) which presents some analogies with *Stringocephalus*, *Waldheimia* and *Terebratulina*. "The loop seems to be essentially like that of *Waldheimia* in form, but the crura of the loop appear to be joined, * * * and the loop-band is armed with numerous spines which point outward toward the shell (?) in all directions," W. and St. J. loc. cit. It cannot be determined from this description whether the spines are directed toward the margin or the body of one of the valves, but it affords another argument against affiliating *Stringocephalus* with *Megathyris* from the mere presence of such appendages.

Type *Waldheimia? compacta*, W. and St. J. Tr. Chic. Acad. Sci. I., p. 119, fig. 3, a, b, c.

### Section MAGASINÆ.

*Magasina*, Gray, B. M. Cat., p. 85, 1853.

Loop reflected, attached both to the hinge margin and to the septum of the hæmal valve.

### Genus TEREBRATELLA.

Apophyses with their hæmal arms connected with the septum by two (septal) processes.

#### Subgenus TRIGONOSEMUS.

*Trigonosemus*, König, Icon. Sect. 1825, p. 3, f. 73. (*T. elegans*).

*Fissurirostra*, D'Orbigny, Pal. Fran. Cret. p. 133, fig. 520. (*F. recurva*), 1847.

*Fissirostra*, D'Orb., Cours. El. Pal., p. 89, 1849.

Shell with produced curved beak or umbo in the neural valve; a minute apical foramen; a large triangular area, flat and marked by the outline of the flat deltidium; cardinal process very prominent. Loop as in *Terebratella*.

Type *Trigonosemus elegans*, König. Fossil in the Cret.

I can only concur with Mr. Davidson in considering this sec

tion as not entitled to generic rank. It may be as well to retain it for the group it indicates, in a subgeneric sense, as it is prior to *Terebratella*.

? Subgenus Lyra.

*Lyra*, Cumb., Sby. Min. Conch., 1816, (*L. Meadii*).
*Terebrirostra*, D'Orb., Pal. Fran. Cret. iv, p. 146, 1847. (*T. lyra*), Dav., Brit. Fos. Brach., p. 67.
*Trigonosemus*, (part), König, (*teste* Dav.)
*Waldheimia*, (part), Gray, Cat. Brach., p. 82.

Shell having the back of the neural valve very long, almost straight, with a false area and narrow deltidium; divided lengthwise internally by the dental plates; truncated and perforate at the extremity. Loop unknown.

Type *Lyra Meadii*, Cumberland. Foss. Cretaceous.

D'Orbigny, Davidson and Woodward seem inclined to place this subgenus under *Terebratella*, as having the loop attached to the septum; while Gray places it as a section of *Waldheimia*. This group had also better be retained for the same reasons given in regard to *Trigonosemus*.

Subgenus Terebratella, D'Orb.

*Terebratella*, D'Orb., Pal. Fran. Ter. Cret., vol. iv, p. 110, 1847. Dav. Int. Brit. Brach., p. 65, (*T. dorsata*).
*? ? Delthyridæa*, McCoy, Syn. Carb. Foss. Ir., p. 130, 1844, fig. 27.
*Delthyris*, Menke, (not Dalman or v. Buch,) Syn., ed. ii, p. 96, (*D. dorsata*, Lam.), 1830.

Shell with a moderate beak on the neural valve; usually truncate and somewhat recurved, fixed by a peduncle passing through the foramen. The latter is usually incomplete and the deltidia consequently separated. An indistinct ridge or septum sometimes exists in the neural valve.

Brachia composed of two lateral loops, the posterior limbs of which meet behind the mouth and the anterior before it. The central spiral lobe is obsolete or entirely absent.

This section contains the typical forms of the genus and almost all the recent species. The fossil representatives range from the Cretaceous upwards.

The diagnosis of *Delthyridæa*, as far as external characters go, would well agree with such species as *T. caurina*, but according to Mr. Davidson no type was given by Prof. McCoy, and his figure is unrecognizable. Dr. Gray gives *T. pectiniformis* as

McCoy's type; it is also one of the types of Dalman's troublesome genus *Rhynchora* and is placed by Gray in the subgenus *Lyra* (Cumb. 1816).

Dalman's first species of *Delthyris* was *D. elevatus*, a true *Spirifer* of the Silurian age. Menke quotes the name *Delthyris* with its proper synonyms and gives *Terebratula dorsata* and *T. caput serpentis* as examples. But, since neither of these species was included in Dalman's list of Delthyrides, the reference of Menke could not be construed so as to allow of the application of *Delthyris* as a generic name to either of the two species he cites. Hence *Delthyris*, Menke, must stand as a synonym of *Terebratella*, while *Delthyris*, Dalman, bears the same relation to *Spirifer*.

Fig. 13.

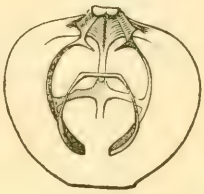


Fig. 13. *Terebratella dorsata*, hæmal valve, showing apophyses.

*Type* TEREBRATELLA DORSATA, Lam.

*Anomia striata magellanica*, Chemn. Conch. Cab. v. viii, p. 101, pl. 78, fig. 710, 711.

*Terebratula Magellanica*, Rve., Conch. Ic., pl. v, fig. 21, a, b, c, d. J. de Conchyl. 1861, p. 127.

*Terebratula dorsata*, Lam., An. Sans. Vert. v. vii, 1819, p. 331.

*Anomia dorsata*, Gmel. 1788, S. N. 3348.

*Terebratula Chilensis*, Brod., P. Z. S. 1836, 134.

*Terebratella Sowerbyi*, King, Zool. Journ. v, p. 338.

*Terebratula bilobata* et *pectinata*, Blainv., Teste Rev. Journ. de Conchy. 1861, p. 127.

*Delthyris dorsata*, Mke., Syn. Ed. 2, 1830, p. 96.

*Hab.* Coasts of Chili southward to the Straits of Magellan. Smithsonian Cab. 17822, 17815. As Chemnitz was not a binomial writer, his name cannot be retained.

From the specimens and descriptions at hand I can only agree with Reeve in uniting the above synonyms under the name of *dorsata*. Of six specimens received from Mus. Cuming, under this name, two were *Terebratellas*; the remainder belonged to the genus *Magas*. *T. transversa*, Sby., probably belongs to this species.

TEREBRATELLA CRUENTA, Dillwyn.

*Anomia cruenta*, Dillw., Syn. p. 295, 1817.
*Terebratula rubra*, Sby., Thes. Conch. pl. lxviii, fig. 9—11.
*Terebratula zelandica*, Desh., 1830, Mag. Zool. pl. 42, 1841. Sby., Thes. vii, p. 361, p. lxxii, fig. 111, 113.
*Terebratula zelandica*, Dav., An. N. H., p. 367, 1852.
*Terebratula sanguinea*, Leach, Zool. Miscell., pl. 76. Lam. An. Sans. Vert. vi, p. 243. Donovan. Nat. Repos., pl. 34.

*Hab.* New Zealand. (Mus. Cuming). Smithsonian Cabinet, 17,823.

Some odd valves, named by Mr. Cuming, of this species (?) have absolutely nothing to distinguish them from varieties of the next species.

TEREBRATELLA RUBICUNDA, Sol.

*Anomia rubicunda*, Sol. MSS. Mus. Banks.
*Terebratula rubicunda*, Donovan, Nat. Rep. pl. 56, fig. 2—4. Sby., Thes. Conch. vii, p. 351, pl. 70, fig. 45—47. Dav. An. Nat. Hist. p. 367, 1852.
*Terebratella rubicunda*, Rve., Conch. Icon. pl. vii, fig. 27 a, b. Journ. de Conchyl. 1861, p. 129.
*Terebratula inconspicua*, Sby. (testa juvenis fide Rve.), Thes. Conch. vii, p. 359, pl. 71, fig. 102—104.

*Hab.* New Zealand. U. S. Exploring Exp. Smithsonian Cabinet, 17,824.

Among a large number of specimens of this species, obtained by the naturalists of the Exploring Expedition, great variations may be observed. Some of them are smooth and polished; others rude, coarsely striated with the lines of growth or radiating striæ. The foramen is small and complete, with a wide and solid deltidium; while in others, of the same size, the foramen is large, incomplete, and the deltidia widely separated. Some are nearly twice as long as wide, others wider than long. Some are distinctly trilobed, others are ovate and smooth. The mesial ridge in the neural valve is usually present. Some of the specimens appeared absolutely identical with valves sent, as of the last species, from Mus. Cuming.

TEREBRATELLA PULVINATA, Gld.

*Terebratula pulvinata*, Gld., Proc. Boston Soc. Nat. Hist. Dec. 1850. Exp. Sh. p. 468, pl. 44, fig. 581.
*Waldheimia pulvinata*, Gld., Otia Conch. (emend) p. 97, 1862.

Cpr., Sup. Rep. Br. Assoc. 1864, p. 636. Suess, Wohns. i, p. 20, 1859.

*Terebratella pulvinata*, Cpr., Check List West Coast Shells, June, 1860.

*Waldheimia pulvinata*, Cooper, Geog. Cat. p. 3, No. 4, 1867.

*Hab.* Orange Harbor Tierra del Fuego. "Oregon" U. S. Exploring Exp. Smithsonian Cabinet (type) 5963, 17,813 (part).

On examining the apophyses of the type, which opened widely enough for this to be readily done, it was at once evident that this species is a typical *Terebratella*.

With regard to the habitat an error has been perpetuated.

Among the specimens of *W. venosa*, Sol., known to be from Orange Harbor, Patagonia, were two evidently belonging to the genus *Terebratella*.

One of them *was attached by its peduncle* to a specimen of the *Waldheimia*. The other was free. At first, as no other recent species was found to agree with it, it was supposed to be undescribed; but, on comparing it with the (heretofore) unique type of *T. pulvinata*, their identity was at once evident.

The Orange Harbor specimens agreed in every particular, except that the type was a little more dusky in color. The foramen, general form, apophyses and punctate structure were precisely similar. One was a little larger and the other a little smaller than the type.

Dr. Carpenter, in his Report (1863) to the British Association, tabulates it from Puget Sound on the authority of Expl. Ex. and Kennerly. The remark in the text below—"80 fms. living, Cooper, Catalina Ids."—on the authority of Dr. Cooper refers to the *T. californica*, the next following species in the text, and not to *T. pulvinata*. Dr. Kennerly's specimens are not to be found, and I am inclined to believe that they might have been the smooth variety of *caurina*, or worn valves of some other species, perhaps *coreanica*.

At any rate, the only definite locality which we have for this species is Orange Harbor, and it is improbable that the same species occurs in both Patagonia and Oregon. The habitat assigned by Dr. Cooper in his Geog. Cat. of "Puget Sound to Arctic Sea" is gratuitous, as no specimens have been obtained from north of Puget Sound, and, as the foregoing remarks indicate, probably none north of Patagonia.

This species is only distinguishable from young *W. venosa* by the apophyses. I have been unable to detect any constant external differences.

There are no specimens of this species in the collections known

to me, in San Francisco; indeed I am only aware of the type and the two other specimens just mentioned.

TEREBRATELLA CAURINA, Gld.—Plate 6, fig. 1, 2, 3.

*Terebratula caurina*, Gld., Proc. Boston Soc. Nat. Hist. vol. iii, Dec. 1850. Exped. Shells, p. 468, pl. 44, fig. 582.

*Terebratella caurina*, Gld. (emend), Otia Conch. p. 97, April, 1862. Cpr., Check List W. C. Shells, p. 1. Cpr. Suppl. Rep. Brit. Assoc. p. 636, 1864. Cooper, Geog. Cat. p. 3, No. 8, 1867. Suess, Wohns. i, p. 25, 1859.

*Hab.* Puget Sound to Sitka. Swan. Dall. Smithsonian Cabinet, 5964 (type), 13,619, 3368, 4177, 4338, 11,785, 11,787.

This species was abundantly obtained at low water mark, adhering to the under surface of large stones and to each other, at Sitka, Alaska Territory. Some young shells, perhaps of this species, were dredged off the peninsula of Aliaska. Puget Sound and Neeah Bay have also furnished specimens.

The very large number of specimens thus obtained afforded an unusually good opportunity for forming a correct idea of the amount of variation possible in a single species. It is a typical *Terebratella*, as the apophyses, which are well preserved in the type, show.

The latter is a small and quite regular specimen, with an ill-defined broad mesial ridge in the neural, and depression in the hæmal, valve.

It has about fourteen subequal radiating ridges, the area broad, hinge line nearly straight, deltidia widely separated, foramen incomplete, large, overshadowed by the sharply pointed apex of the neural valve, which is not truncate and resembles the neural apex of *Rhynchonella*. It is of a grayish ash color, ·6 of an inch wide and ·5 long.

The examination of sixty specimens from Sitka gave the following range of variation:

Greatest width, 1·8 inch. Greatest height, 1·7 inch. Diameter of most inflated specimen, 1·2 inch. The most transverse specimen measured 1·8 inch wide by 1·2 inch long. The most produced specimen measured ·7 inch long by ·4 inch wide. The most compressed specimen was ·35 inch diameter by 1·25 wide and ·75 long.

The colors were usually of a deep crimson mixed with yellow, quite different from the bright color of *T. coreanica*, and *W. Grayi;* but they varied from light ashy yellow to a very dark livid purple, and the epidermis from clay color to blackish brown. The color was sometimes stronger on the lines of growth

externally, while the interior was nearly white; while in others the whole substance of the shell was evenly suffused with color, inside and out.

The incomplete foramen appears to be a constant character, though the degree of approximation of the deltidia varies a good deal. The area is almost always strongly marked and nearly smooth. The lines of growth are usually strong and often imbricated, especially when the radiating ribs are strong.

The hinge line is normally nearly straight, and recalls *Spirifer*, but in some adult and many immature specimens is very much arched. The sinuosity of the margin caused by the broad neural mesial ridge is generally present, but varies very much in degree, and is sometimes almost evanescent. When the ribs are strong the margins are crenulated, and *vice versa*. The number of ribs in an adult specimen is from thirty to forty. They vary very much in prominence. Some specimens have none at all; others have half the shell smooth and half ribbed. Some are ribbed only on the umbones; others only near the margin. One specimen, which taken alone would certainly have been considered distinct, is smooth, pink, with a prominent apex, and short, bifurcating, varicose, impressed lines scattered over the surface, a sharp carina on the neural and a corresponding groove on the hæmal valve.

The shell is always thick, solid and strong, even in the smallest specimens. The form presents every possible variation from longitudinally oval to quadrispherically transverse. Many are unsymmetrical, and most of them are overgrown with polyzoa, serpulæ, and corallines. The peduncle is very short and stout.

The apophyses are extremely delicate and fragile, and unusually small in proportion to the shell. The reflected portion of the loop is very short, and the whole of the skeleton is broader in proportion than in any other species known to me. The septum is very small and triangular, it diminishes on each side from the point of attachment of the loop processes and is evanescent in the umbo of the hæmal valve. The most elevated point is midway between the cardinal process and the anterior margin. The cardinal process is inconspicuous. An indication of an obscure mesial ridge may sometimes be seen in the neural valve. The interior of the shell is sometimes a little perlaceous, but it is usually without lustre. The punctures are smaller, more circular and fewer in number than in *T. pulvinata*. An examination of the young shells, only about ·2 in. in extreme width, showed some interesting points.* The septum is calcified very early and is

* From the study of these immature forms I have come to the conclusion that the genus founded by Prof. King on *Terebratula capsula*, Jeff.,

thick, prominent, bifurcate at its extremity, and serrated on its anterior edge. The bifurcation is the first indication of the septal processes which are the last to be calcified, and when the extremely thin hæmal processes are yet incomplete the young shell closely resembles a *Magas*. In the beak of the neural valve just inside the foramen is a very prominent thin lamina or septum which half closes the foramen. In the adult the muscular system is not largely developed. The pedicel muscles are the strongest. The cardinals are slender and their bases are spread over a wide extent of the neural valve, but the muscular impressions are imperceptible. The adductors are small and slender. The brachia follow the lateral loops of the apophyses and cross below the mouth on the reflected portion and the septal processes. There is no central spiral lobe. The fringes are in a single row, flattened and extremely thin; in an adult they are about ·13 in. long. They are much more slender than in *Terebratulina* or *Megerlia*. When fully extended they are far from the margin of the valves. The mouth is circular, situated between the adductors. The visceral part of the system is protected by a thin tough membrane. The color of the animal is reddish or brownish, the ovaria vary in the same way. The perivisceral fluid is of a reddish-yellow color.

The umbones of both valves are generally eroded by contact with stones. The animal seemed to have the power of turning half around on its peduncle at will.

Terebratella coreanica, Ad. and Rve.

*Terebratula coreanica*, Adams and Reeve, Voy. Lam. 1850, p. 71, pl. xxi, fig. 3. Rve., Conch. Ic. vii, fig. 28, a, b.
*Terebratula miniata*, Gld., Proc. Boston Soc. Nat. Hist. 1861, p. 323. Suess., Vienna Acad. 1859, p. 206.
*Terebratella coreanica*, Dav., Ann. Nat. Hist. 1852, p. 367. Schrenck, R. v. Amurl. 1867, p. 468. Rve., Journ. de

cannot be accepted until further information is obtained. The same may be said with regard to *Waltonia* (*Valenciennesii*) Dav. The latter genus has been withdrawn by the author, and the specific name rather hastily applied to the mature form described by the same gentleman (in the P. Z. Soc. 1852, p. 77, pl. xiv, fig. 7–9,) as *Terebratella Evansii*. While it is not impossible that the two are identical, still it would seem unnecessary to reject a name applied to a mature and unmistakable species for one given to a young shell which could hardly be identified without the aid of a very large series of individuals of various ages. The references are as follows:

*Gwynia* (*capsula* Jeffreys) King, Proc. Dub. Univ. Zool. and Bot. Assoc. Vol. i, 1859, p. 258, fig. 1 to 5. Rve., Conch. Icon. pl. x, fig. 39.
*Waltonia* (*Valenciennesii*) Dav., An. Nat. Hist. 1850, p. 475. Ib. 1852, p. 372. Gray, B. M. Cat. p. 101. Dav., An. Nat. Hist. 1861, p. 38.

Conchyl. 1861, p. 129. Cpr., Sup. Rep. p. 636, 1864. Coop. Geogr. Cat. 1867, p. 3, No. 7.

*Hab.* Corea, Belcher, N. Japan Seas, Schrenck. ? Neeah Bay, Swan. Smithsonian Cabinet, ? 15,598.

Dr. Carpenter has marked on the tablet of a worn and broken neural valve "*T. coreanica* var. *frontalis*, Midd.," Neeah Bay, Swan. On comparison with figures, I am disposed to refer the valve, which though worn smooth, still retains some slight traces of striæ; to *W. Grayi*, Dav., which has a very large foramen, while both Reeve and Schrenck figure *coreanica* as with a small complete foramen.

Middendorf's *T. frontalis* is undoubtedly a *Terebratella*, but, assuming the correctness of his figures and descriptions, I can see no reason for uniting *frontalis* with *coreanica*, or indeed with any other species with which I am acquainted. It seems to be remarkably distinct and belongs to a different fauna from *coreanica*. The young state of the latter, according to Schrenck, is of a uniform reddish color (var. *concolor*) while the adult is radiated with red (var. *radiata*); the former is *miniata*, Gld., the latter the typical *coreanica*.

TEREBRATELLA, ———?—Plate 6, fig. 4.

*? Terebratella suffusa*, Rve., Conch. Ic. pl. v, fig 18. Journ. de Conchyl. 1861, p. 128.

*Hab.* "*?* Cape of Good Hope, Ex. Ex." Smithsonian Cabinet 5110.

A single specimen, which resembles Reeve's *suffusa* as figured in the Conch. Icon., exists in the Smithsonian Cabinet, and is doubtfully marked as from the Cape. It differs from *suffusa*, as described by Reeve, in wanting the suffusion, being of a light yet rather warm brown; in the deltidia being more widely divided, perhaps because it is an older shell than Reeve's type; and finally in having a flexuous margin and faint depression near the middle of the margin of the hæmal valve. This, however, is not noticeable in the younger portion of the shell.

I am inclined to regard them as identical, and in order that some one, who may be able to examine Reeve's type, can settle the point I add a description and figure of the loop, which Reeve has not described.

The crura are small, slender, short and acute. The loop processes are exceedingly slender, mere threads in fact, and roundly deflected outward at first; bending inward just before the neural bend, they give off two moderately broad septal processes which meet each other at the end of the septum with an angle of 60°

(not at right angles to the septum and behind its end, as in *T. dorsata* or *chilensis*). The main processes are then deflected neurally, and the extreme "bight" of the loop is straight and somewhat angulated at each side. The perforations externally are moderate, arranged in quincunx order, smaller and more regular than in *T. dorsata*, which is its nearest analogue.

The species appear to me to be perfectly distinct from any other described *Terebratella*.

The other recent species are:

*Terebratella frontalis*, Midd. Malac. Rossica, iii, p. 2. Sib., Reise. Bd. ii, p. 241, pl. xviii, fig. 9, 10, 11, 12, 13 and 14. *Hab.* South coast of the Ochotsk.

*Terebratella rubella*, Sby., Thes. Con. v, i, p. 350, pl. 69, f. 40, 41, 42. *Hab.* Japan.

Some little confusion attaches to this species on account of its outward similarity to *Waldheimia picta*, Chemn. sp. from Java and *Ismenia sanguinea*, Chemn. sp. (+ *sanguinolenta*, Gm., + *erythroleuca*, Quoy, + *pulchella*, Sby.,) from the Philippines and the Sandwich Islands.

*Terebratella Bouchardii*, Dav., P. Z. S. 1852, p. 77, pl. xiv, fig. 4 to 6. *Hab.* ? This species somewhat resembles *T. frontalis*, which in Middendorf's figures seems to have lost the deltidia.

*Terebratella Labradorensis*, Sby., Thes. Conch. vii, p. 362, pl. 71, fig. 89, 90. *Hab.* Coast of Labrador.

*Terebratella Mariæ*, A. Ad., An. Nat. Hist. 1860, p. 412. *Hab.* Japan.

### Subgenus Laqueus, Dall.

Shell with the reflected portion of the loop attached by slender processes, on each side, to the hæmal processes, at or near the points where the two septal processes branch off to the septum. Foramen complete.

It will be observed that the reflected part of the loop is attached by the two (lateral) processes, not to the septum nor to the septal processes, but to the hæmal portions of the loop, (which I have termed hæmal processess); thus the two septal processes, the two lateral processes, and the "bight" of the neural loop, form a somewhat sinuous ring, intersected by the point of the septum, the hæmal processes and the two sides of the neural loop.

*Type. Laqueus californicus*, Koch sp. Plate 7, fig. f, pl. 8, fig. 9, 10.

*Terebratula californica*, Koch, Kuster, Nov. Ed. Martini, viii,

pl. 26, fig. 21, 22, 23 (?). Sby., Thes. Conch. vii, 352, pl. lii, fig. 50, 51, 52.

*Waldheimia californica*, Gray, Brit. Mus. Cat. p. 60, No. 8. Cpr. Sup. Rep. Br. Assoc. p. 568 & 636. Cooper, Geogr. Cat. p. 3, No. 5.

Not *Terebratula californica*, Auct., = *W. venosa*, Sol.

*Hab.* California. Catalina Island, 80 fms. Cooper. Smithsonian Cabinet, 19,395, Cp. 1093.

Shell oval, thin, inflated, pale at the umbones, elsewhere of a light reddish brown, darker toward the margin; perforations large,, oval, crowded, arranged in quincunx order externally; minute circular, very close together, internally.

Margin straight, without perceptible curve or sinuation, slightly angular at the anterior edge, giving a very slight appearance of truncation. Valves nearly equally inflated. Beak of the neural valve small, recurved, obliquely truncated. Foramen small, entire, apical; the carination of the edge of the false area encroaches on the perforation in a triangular point on each side. False area small, narrow, smooth, roundly carinated at the edge. Deltidia very short and wide, united. Lon., 1·9 in.; lat., 1·6 in.; diameter, 1·2 in.; height of neural apex above the opposite umbo, ·15 in.; diameter of foramen, ·1 in. Peduncle very short and stout. Teeth of the neural valve short and stout. Hinge line very slightly emarginate (for the cardinal process) beneath the umbo, otherwise gently rounded. Teeth supported by shelly plates beneath the hinge line. Cavity of the apex infundibulate. Out of this cavity proceed two strong, but not prominent, ridges, which radiate toward the angles of the anterior edge of the margin, but become evanescent before passing the central third of the shell. Between these ridges are two others, one on each side, close to the median line, shorter and less prominent than the first. There are faint indications of others outside the two first mentioned, and these ridges, except the first two, are variable in different individuals. Cardinal process very inconspicuous. Cardinal plate broadly pentagonal, centrally depressed. Septum not prominent, diminishing in height from the edge of the plate forwards, and not extending more than half the length of the shell; point of attachment of the apophyses quite close to the plate. Apophyses start from the anterior angles of the plate and give off two curved slender crura; the hæmal processes are very slender; septal processes still more so; reflected portion quite broad, somewhat angulated behind, giving off two broad, thin lateral processes, which are attached to the inner edge of the hæmal processes at the point from which

the septal processes are extended to the septum. There is no flat top to the latter, such as is seen in *Ter. dorsata*, *effusa* and *caurina*.

This magnificent species was long confounded with *W. venosa*. The septum and characteristic portion of the apophyses were so far back that it was only by separating the valves that the peculiar character of the loop could be certainly determined. It is readily distinguished from *W. venosa* by the want of the prominent cardinal process so evident in that species, different color, the small foramen, and sharply cut cardinal area.

LAQUEUS SUFFUSUS, n. sp.? Plate 7, fig. g, h, s.

*? ? Terebratella rubella*, Sby., Thes. v, i, p. 350, pl. 69.

*Hab.* Wharf at Yokohama, Japan. R. Pumpelly. Smithsonian Cabinet, 11,784.

Shell small, ashy white, with occasionally a tinge of salmon color on the strongest lines of growth, smooth, almost polished; solid and moderately thick; lines of growth moderately conspicuous at intervals, but rounded and hardly interrupting the smoothness of the shell. Punctures smaller, less widely separated, and more circular, on the exterior, than in the last species; internally extremely minute. Lon., ·72 in.; lat., ·52 in.; diam., ·34 in.

The specific characters are best indicated by comparing it with the last species, from the young of which it differs in many particulars, more especially in being very much less transverse, more solid, with a much narrower and longer deltidium, more arched hinge line, and very much stronger and heavier hinge teeth.

Leaving out the question of size, it differs from the adult *californica* in the following particulars: The hinge teeth are more solid, and the plates which support them are usually solid masses of callus, occasionally showing a projecting knob below the teeth, and continuous with the remainder of the shell, instead of having an indentation behind each plate. There are no excavations under the hinge plate as in the last species; the plate is narrower, more excavated above and more solid. The septum falls away behind the point where the septal processes are attached before rising to the hinge plate.

The point of attachment of the septum is much nearer the middle of the shell than in the *californica*. Finally, the apophyses in this species are, proportionately, twice as solid as in the last, which is ten times its size.

Of a dozen or fifteen specimens collected by Prof. Pumpelly, most had the apophyses destroyed by insects, which had eaten the animal matter; but four or five remained perfect, displaying

the peculiar loop. But little variation was noticed among them, which consisted principally in the greater or less inflation of the valves, and the absence or presence of the dental laminæ. Some were slightly more transverse than others, but as a whole they were remarkably uniform. The most transverse individual measured ·62 in by ·72 long, and ·225 diameter. The most compressed measured ·50 in. wide by ·70 long, and ·36 diam. A young *californica*, about the same size, measured ·72 long by ·78 wide, and ·55 in. diameter.

Mr. Davidson suggests that this species may be conspecific with *Terebratella rubella*, Sby. I have not been able to make a comparison of specimens, but the form of the two species is very similar. The coloration of *T. rubella*, as figured by Reeve, is very different, however, as is evident from his comparing it to *Wald. picta* and from the figures. None of the specimens of *suffusus* show more than the faintest tinge of salmon color on the stronger lines of growth.

A comparison of types alone can determine the question. They may or may not belong to the same subsection.

It is not improbable that after more careful examination of recent species now referred to *Terebratella* or *Waldheimia*, others may be referred to this subgenus.

### Subgenus Kingena, Dav.

*Kingena*, Dav., Mon. Cret. Brach. p. 42, 1852.
*Ismenia*, (part), Gray, B. M. Cat. p. 104 (*Megerlia*).
*Megerlea*, Dav., Mem. Lin. Soc. de Normandie, 1856, p. 263.
*Terebratula*, Auct.

Shell as in *Terebratella*, with the posterior part of the reflected portion of the loop broad, angulated, with the two angles bent down on each side and joined to the septum directly (not to the hæmal or septal precesses), forming a broad ring, only intersected by the septum. Exterior granulated, foramen entire.

*Type*. *Kingena lima*, Defr. sp., Chenu Man. de Conchyl. ii, p. 205, fig. 1052 (as *M. truncata*). Pl. 8, f. 14.

*Terebratula lima*, Defr., Dict. Sci. Nat. 1828, vol. 53, p. 156.
*Kingena lima*, Dav. Mon. Cret. Brach. p. 42, pl. 4, fig. 15 to 28, pl. 5, fig. 1 to 4. Woodw. Man. p. 219, fig. 103.
= *Terebratula pentangulata*, Woodw., + *ventro-plana*, Roem., + *Hebertiana*, D'Orb., + *Spinulosa*, Morris, +*sex-radiata*, J. Sby.

Fossil in the cretaceous strata of England and France.

This subgenus is sufficiently distinct, and forms a natural link between *Laqueus* and *Ismenia*.

Subgenus ISMENIA (King), Gray.

*Ismenia*, King, Permian Foss. p. 81, 142 (not *Ismenia*, King, Perm. Foss. p. 245, = *Terebratella*).

*Ismenia*, Gray, B. M. Cat. p. 104. A. Ad. An. Nat. Hist. 1863, p. 99.

Shell externally resembling *Terebratella*. Apophyses broad and short, attached first by the septal processes to a short, stout septum, then recurved, the broad posterior edges of the reflected portion touching and blending with the septal processes and the adjacent part of the hæmal processes, forming a funnel-shaped ring, into which the septum does not project. The lateral loops of the apophyses remain open in the adult.

Brachia without a median spiral lobe.

The name *Ismenia* was originally founded by an error, (see Perm. Foss. p. 245), upon *Terebratulites pectunculus*, Schloth. This error Prof. King corrects, as above, stating that his intended type was *T. pectunculoides*, Schloth. The latter species is only distinguished from the typical *Terebratellæ* by a few calcareous denticles on the anterior terminations of the lateral loops. Now *T. pectunculus* has the loop above described as characteristic of *Ismenia*, as Quenstedt's figure (erroneously referred to by Dr. Gray, in B. M. Cat. p. 95, where the figures of *T. pectunculoides* are referred to, by the numbers which really refer to *T. pectunculus*, which is on the same plate) shows.

Dr. Gray, either intentionally or by mistake, thus retains *pectunculus* as the type in spite of Prof. King's erratum, and the subgenus thus limited will stand properly as of Gray. There can be no doubt as to Prof. King's intentions, as he refers to Davidson's figure of *T. pectunculoides* in the An. Nat. 1850, pl. xv, fig. 5 a, b.

Type *Ismenia pectunculus* (King in err. Per. Fos. p. 81, 142), Gray, B. M. Cat. p. 104 = *Terebratulites pectunculus*, Schlotheim, Quenst. Handb. p. 466, pl. 37, fig. 23, 25.

Fossil, Oxford clay, France; Coral Rag. Germany.

ISMENIA SANGUINEA, Chemn. sp. Pl. 8, fig. 13.

*Anomia sanguinea*, Chemn., Conch. Cab. viii, p. 96, pl. 78, fig. 706. Dillwyn, Rec. Shells, p. 293, 1817 (not Sol.)

*Anomia sanguinolenta*, Gmel., S. N. p. 3347.

*Anomia cruenta*, Sol. MS. in Mus. Banks (not Dillwyn).

*Terebratula cruenta*, Donovan, Nat. Repos. pl. 56, fig. 1.

*Terebratula erythroleuca*, Quoy and Gaim. Voy. Astrol. iii, p. 557, pl. 85, fig. 8, 9. Desh. in Lam. ed. ii, vii, p. 350.

*Terebratula sanguinea*, Sby., Thes. Conch. vii, p. 357, pl. 71, figs. 71–73 (not of Leach, Lam. nor Donovan).
*Terebratella sanguinea*, Dav., An. Nat. Hist. 1852, p. 368. Gray, B. M. Cat. p. 90. Rve., Con. Ic. pl. vii, fig. 25 a, b, c. Journ. de Conchyl. 1861, p. 128.
*Terebratula pulchella*, Sby., Thes. Conch. vii, p. 360, pl. 71, fig. 105—107.
*Megerlea pulchella*, Dav. An. Nat. Hist. 1852, p. 369.
*Ismenia pulchella*, Gray, B. M. Cat. p. 104.
*Ismenia sanguinea*, A. Adams, An. Nat. Hist. ii, 1863, p. 99.

*Hab.* Philippines, Sandwich Islands, Japan. Smithsonian Cabinet, 17,820, 17,821.

This beautiful little species, after having been passed from *Terebratella* to *Megerlia* and back again by various authors, has finally found a resting place in the genus *Ismenia* as restricted by Dr. Gray and Mr. A. Adams.

There is some variation in the obliquity and breadth of the apophyses in different individuals, but the essential characters remain the same.

The punctures in the shell are larger and more conspicuous than in any species of the group with which I am acquainted. The imbricating prisms of which the shelly structure is composed are beautifully conspicuous with a very low power, inside; and even the apophyses seem to exhibit the same or a similar structure, though impunctate.

The colors vary from almost pure white to a livid red marked with brownish streaks. The normal color is white, with a median line of bright red blotches, bounded on each side by a white streak, outside of which the dashes of red radiate toward the margin.

The form is usually somewhat transversely oval, and quite regular. The exterior is usually smooth, almost polished, and very slightly marked with lines of growth. Occasionally, however, they are rough, distorted, and of a rude exterior, resembling *T. rubicunda* junior.

In general, the foramen is moderate and the deltidia are united, but in many cases the foramen is large, the deltidia are more or less widely separated, and the apex is produced.

I cannot doubt the identity of *T. pulchella*, Sby., with *T. sanguinea* of Davidson and Chemnitz.

In the absence of the apophyses this specimen might be confounded with *W. picta* and *T. rubella*.

The only other recent species is *Ismenia Reevei*, A. Ad., An. Nat. Hist. 1863, p. 99. "A large pure white species." Ad. loc. cit. Hab. Gotto, Japan, 48 fathoms.

Genus MEGERLIA, King.*

*Megerlia*, King, Perm. Foss. 81, 145, 1850. Dav., An. Nat. Hist. 1852, p. 369. Ibid., 1861, p. 38. Woodw., Rec. and Foss. Shells, p. 219. Rve., Conch. Icon. pl. xi. Journ. de Conchyl. 1861, p. 133. Dav., Int. Clas. Brit. Brach. 1851–4, p. 68. H. and A. Adams, Gen. Rec. Moll. ii, p. 578. Jeffreys, Brit. Conch. vol ii, p. 22.

*Megerlea*, Dav., Intr. a l'Hist. nat. des. Brach. vivent et fossiles Mem. Lin. Soc. de Normandie, 1856, p. 129. Chenu, Man. de Conchyliol. vol. ii, p. 205.

*Megathyris*, D'Orb. (part), *M. oblita.*

*Orthis*, Philippi, Moll. Sic. ii, p. 67. Michelotti, Faun. Mio. pl. ii, fig. 21.

*Terebratella.* D'Orb. An. Sci. Nat. 1848, p. 66 (part).

*Anomia*, Linn., Pallas, &c.

*Terebratula*, Auctorum.

Shell transversely oblong with a straight wide hinge line, distinct area and large incomplete foramen. Externally striate, internally pustulose, somewhat pearly.

Loop resembling that of *Ismenia*, but with the lateral loops filled up with calcareous matter in the adult, forming two spatulate processes.

Brachia behind the mouth, furnished with two lateral lobes and a conspicuous median spiral lobe.

This genus approaches *Ismenia* in the form of the loop, but otherwise is totally unlike that group, which is more properly placed among the *Terebratellæ*.

Fig. 14.

*a* *b*.

*Megerlia truncata*, $\frac{3}{2}$ nat. size. *a*, hæmal valve with the animal; *b*, same with animal removed, showing the apophyses.

* This is very close to *Megerlea*, Robineau-Desvoidy, Essai sur les Myodaires, 1830, a genus of Diptera. In fact, when properly spelled, they are identical and were named for the same individual. I do not know whether Desvoidy's genus still stands, but in case it does, *Megerlia*, King, will have to be dropped, as the dipterous genus has twenty years' priority.

*Note.*—A letter from the eminent dipterologist, Baron Osten Sacken, informs me that Desvoidy's genus has not been adopted by entomologists, and therefore we are at liberty to retain the old, familiar and well established name of *Megerlia* for the present genus.

MEGERLIA TRUNCATA, Lin. sp. Fig. 14.

*Anomia truncata*, Lin., Syst. Nat. 1152. Born., Mus. 118, pl. vi, fig. 14. Chemnitz, Conchyl. Cab. viii, 90, pl. 77, fig. 701. Gmel., S. N. 3343. Dillwyn, Rec. Shells, i, p. 292. Poli, Test. Sicil. p. 191, pl. xxx, fig. 16, 17.

*Terebratula truncata*, Retz., Nov. Gen. p. 14. Lam., Hist. An. sans Vert. vi, p. 247. Ed. 2, vii, p. 333. Sby., Thes. Conch. vii, p. 354, pl. 71, fig. 64–67. Blainv., Dict. des Sci. Nat. liii, p. 139. Phil., Moll. Sicil. i, p. 95, fig. 12, pl. vi. Quenstedt, Handb. p. 462, p. 37, fig. 10.

*Terebratella truncata*, D'Orb., Ann. Sci. Nat. 1848, viii, p. 66, pl. vii, fig. 11, 12, 16, 37.

*Terebratula monstrosa*, Scacchi, Oss. Zool. ii, p. 1.

*Anomia disculus*, Pallas, Misc. Zool. p. 184, pl. xiv, fig. 1, 1766.

*Terebratula disculus*, Blainv., Dict. Sci. Nat. liii, p. 138.

*Orthis truncata*, Phil., Sicil. ii, p. 69.

*Terebratula oblita*, Mich., Brach. p. 4.

*Orthis oblita*, Mich., Faun. Mioc. pl. ii, fig. 21.

*Megathyris oblita*, D'Orb., Prod. iii, p. 134.

*Terebratula scobinata*, Gmelin, + *T. decussata* de Blainv. + *T. irregularis* de Blainv. fide Rve.

*Megerlia truncata*, King, Permian Foss. p. 145. Dav., Ann. Nat. Hist. 1852, p. 369. Gray, Brit. Mus. Cat. p. 103, fig. 15, 16. Rve., Conch. Icon, pl. xi, fig. 47 a, b, c. Journ. de Conchyl. 1861, p. 133. Woodw., Man. Rec. and Foss. Shells, p. 219, fig. 122, pl. xv, fig. 9. Chenu, Man. de Conchyl. ii, p. 205, fig. 1053–55 (not 1052 = *Kingena lima*, Dav.) Angas, Austr. Sh. H. and A. Adams, Gen. Rec. Moll. ii, p. 578, pl. cxxxi, fig. 3, 3 a, 3 b, 3 c. Jeffreys, Brit. Conch. p. 22, ii.

*Hab.* Mediterranean and adjacent shores of the Atlantic. Australia (Angas). Smithsonian Cabinet, 14,560, 14,561, 11,781.

Woodward's figure (122) of this well known species is not very good. In none of the specimens which I have seen does the septum appear so prominently or extend so far beyond the apophyses.

The collection includes a specimen from New South Wales (Coll. Angas), sent under the above name. The shell and apophyses presented no constant difference from Mediterranean specimens. The animal was in a perfect state of preservation in both, and I noticed the following differences, of which only a much larger series would be sufficient to establish the constancy.

The central spiral lobe of the brachia, prominent in the European species, seemed to be nearly wanting in the Australian shell. The fringes in the former were nearly twice as long, the individual filaments much more slender, and five or six times as numerous as in the latter.

The range thus indicated is extraordinary, and much more remarkable than the discovery of Indo-Pacific species in Japan by Arthur Adams; still the recent deep sea dredgings by English and American naturalists overturn many of our former notions in regard to the distribution of marine animals, and we may expect to find the range of low forms, such as the Brachiopoda, greatly increased by further researches.

### Genus MAGAS, Sby.

*Magas*, Sby., Min. Con. vol. ii, p. 39, 1818. Dav., Int. Br. Brach. p. 70, 1851. Mon. Cret. Brach. p. 19. Ann. Nat. Hist. 1852, p. 371. D'Orb., Pal. Fran. Ter. Cret. 1847, iv, p. 54. Gray, B. M. Cat. 1853, p. 98. Woodw., Rec. and Foss. shells, p. 217. H. and A. Adams, Gen. Rec. Moll. ii, p. 577. Chenu, Man. de Conchyl. ii, p. 207. Rve., Conch. Icon. pl. 8. Journ. de Conchyl. 1861, p. 130, King, Perm. Foss. p. 81.

*Orthis* sp. De Koninck (not Dalman).

*Rhynchora*, Dalman, 1827 (*R. spathulata*) part.

Shell with a prominent septum in the hæmal valve, to which the hæmal processes of the loop are attached by their sides before being reflected.

(In *Terebratella* the hæmal processes are attached to the septum by septal processes; in the present genus no septal processes intervene, but the attachment is of the hæmal processes themselves directly to the septum by their inner edges.)

*Type Magas pumila*, Sby.

#### Subgenus MAGAS.

Reflected portion of the loop incomplete in the adult.

Fig. 15.

Fig. 15 a, b. *Magas Pumila*, $\frac{3}{1}$ nat. size. *o*, crura; *l*, incomplete loop; *s*, septum.

*Type.* *Magas pumila*, Sby., fig. 15 a, b.

*Magas pumila*, Sby., Min. Conch. ii, p. 40, pl. 119, fig. 1 to 5, 1818. Bouchard and Dav., Bull. Soc. Geol. de France 2nd. ser. v, p. 139, pl. ii, fig. 1 to 11. Dav., An. Nat. Hist. v, pl. xv, fig. 2. Quenst., Handb. p. 476, pl. xxxviii, fig. 15.

*Magas truncata*, Rose, in Woodw. Geol. Norfolk, pl. 6, fig. 9.

*Magas magna*, } Woodw., Synopt. Tab. p. 22, fide Gray.
*Magas punctata*, }

*Terebratula concava*, Lam. An. s. Vert. vi, p. 251, No. 26, (1819). Dav., An. Nat. Hist. v, 1850, June. Deshayes, Lam. Ed. 2d, vii, No. 26.

*Terebratula magas*, Blainv., Man. Mal. p. 512, pl. 54, fig. 1 (1825).

*Terebratula pumila*, v. Buch., Mém. Soc. Géol. de France, iii, 1st series, p. 216, pl. 19, fig. 5.

*Magas pumila*, Gray, B. M. Cat. p. 99, fig. 9, 10. Woodw., Rec. and Foss. sh. p. 217, fig. 117. Chenu, Man. de Conchyl. ii, p. 207, fig. 1059, 1060. King, Permian Foss. p. 81.

*Hab.* Fossil in the cretaceous beds of Europe.

In this, the type of the genus, the hæmal valve is almost flat and the neural valve inflated and nearly touched by the apex of the septum. The beak of the neural valve is strongly recurved, with a minute foramen and rudimentary deltidium. The cardinal process is prominent and the area of the neural valve is well defined. Although only found in a fossil state, many of the specimens retain radiating colored bands.

MAGAS DAVIDSONI, De Kon.

*Rhynchora Davidsoni*, De Koninck, fide Dav. An. Nat. Hist. 1855, p. 434, pl. x, fig. 4, 4a.

*Hab.* Fossil in the cretaceous beds of Mæstricht.

This species is said by Mr. Davidson to be similar to one of Dalman's types (*R. spathulata*) and the examination of the internal structure by M. Bosquet, during his work on the cretaceous Brachiopoda of Maestricht, shows that it is a typical *Magas*. The apophyses exactly resemble those of *M. pumila*, while the hinge margin is much broader than in that species, and nearly straight. The other type of *Rhynchora* was *Waldheimia? pectinata*, Linn., according to Woodward and Dr. Gray. This disposes of a genus badly characterized and founded on an error, which has been the cause of much difficulty and confusion. (See Woodw. Man. Rec. and Foss. Shells, p. 217, note).

? MAGAS PATAGONICA, Gould. Pl. 6, fig. 11, 12.

*Terebratula patagonica*, Gld., Proc. Boston Soc. Nat. Hist. Dec. 1850. Otia Conch. p. 97. Ex. Exp. shells pl. 44, fig. 583, 583e.

*Waldheimia patagonica*, Gld., Otia Conch. Rect. p. 246, Index p. 256.

*Terebratulina ? patagonica*, Suess, Wohns. der Brach. ii, p. 16.

*Hab.* Patagonia, Orange Harbor, U. S. Ex. Exp. Smithsonian Cabinet, 5965 (type). Mus. Comp. Zool.

This species (which must not be confounded with the fossil *Waldheimia patagonica*, Sby., Darwin's S. Am. p. 252, pl. ii, fig. 26, 27, 1846, and Gray, B. M. Cat. p. 60), was originally referred by Dr. Gould to *Terebratula*, and, in his rectification, to *Waldheimia ;* it seems to be a true *Magas*, and among a lot of small specimens referred by Mr. Reeve to *Terebratella dorsata* (juv). I found a number of specimens, although the type was supposed to be unique. In the type specimen the apophyses are broken off, but the septum remains intact.

The shell is of a waxen white color, fan-shaped, moderately oval or transverse, ornamented with rounded divaricating ribs or plications which are evanescent at the apices of the valves and strongest at the margin. It is generally compressed, though a moderate degree of inflation exists in a few individuals. The neural valve is most inflated and has a prominent beak slightly recurved and pointed at the apex, beneath which is a large horse-shoe-shaped foramen, with parallel sides and widely separated deltidia. The latter are narrow and long, divided by an impressed line from the false area, which is short and very wide. The hæmal valve is provided with an inconspicuous but acute apex, and small, moderately wide cardinal process. The teeth and sockets are moderately strong and the former are not supported by laminæ. The punctures are very prominent, both inside and outside, and almost visible to the naked eye. They are quite circular. The hinge plate is wide and excavated in the middle, or rather there is no transverse lamina before the cardinal process and between the sockets. Instead, two thin laminæ are placed between the under sides of the sockets, extending obliquely inward for a short distance, and attached to the cavity of the apex, forming a triangular ridge in the median line, from which the septum takes its rise. The latter is broad and biangulate at its neural extremity. Two hæmal processes, provided with short pointed crura, proceed from the sockets and are attached, about midway between the valve and the apex of the septum, to the latter. From the posterior apical

angle of the latter two broad, roundly-recurved processes are extended posteriorly. The anterior apical angle of the septum is extended a short distance in front of them and is somewhat before the anterior point of its base. The muscles are stout and well developed; the neural insertion of the cardinals is about the middle of the valve. The margin is sometimes slightly flexuous. The measurements of three specimens are ·44, ·48 and ·24 in. long; ·5, ·52 and ·32 wide; by ·16, ·21 and ·09 in. in diameter. The apex of the neural valve is ·09 in. above the apex of the hæmal valve in the largest specimen, and the width of the foramen is ·05 inches.

This is the first described recent species, belonging to the true type of *Magas*, with the reflected processes disunited, and does not appear to have been noticed by European authors* under any name. Since the opinion might be advanced that the reflected processes had been broken apart, I would state that I have examined specimens still containing the brachia, and the complete disunited ends of the processes might be readily seen with a glass through the translucent animal matter. The brachia appeared to be a simple loop without lateral lobes or central spiral lobe. It is still possible, however, that in older specimens the loop may be completed, bringing the species into the next section.

### Subgenus Magasella, Dall.

Shell with the reflected portions of the apophyses united, forming a loop.

This comprises most of the recent species of *Magas*.

Fig. 16.

Fig. 16 a, b. *Magasella Evansii*, Dav., hæmal valve and profile; *s*, septum.

*Type*. *Magasella Evansii*, Dav., fig. 16 a, b.

*Terebratella Evansii*, Dav., Proc. Zool. Soc. 1852, p. 77, pl. xiv, fig. 7—9. An. Nat. Hist. 1852, p. 368, n. 26. Woodw., Rec. and Foss. sh. p. 217, fig. 116.

*Magas Evansii*, Gray, B. M. Cat. p. 99, fig. 11 and 12.

*Magas Valenciennesii*, Rve., Conch. Icon. pl. viii, fig. 31, a, b, c. Journ. de Conchyl. 1861, p. 130.

* Except Suess, l. c.

*Hab.* New Zealand. Coll. Cuming.

This species has been referred to recently by Messrs. Davidson and Reeve, as the adult of *Waltonia Valenciennesii*, Dav., an immature? brachiopod previously described. For reasons elsewhere stated I have thought it best to retain the original name until more is known.

MAGASELLA FLEXUOSA.

" *T. magellanica*, var.," Reeve, MSS. label.

*? Terebratula flexuosa*, King, Zool. Journ. vol. v, p. 337. Sby., Thes. Conch. vii, p. 347, pl. 69, fig. 23, 24.

*? Terebratella flexuosa*, Gray, B. M. Cat. p. 87. Dav., An. Nat. Hist. 1861, p. 38. H. and A. Ad., Gen. Rec. Moll. ii, p. 576.

*Terebratella Magellanica*, Reeve, Conch. Icon. pl. ? fig. ? Journ. de Conchyl. 1861, p. 127.

*Hab.* Straits of Magellan, Orange Harbor, Ex. Exp. Smithsonian Cabinet, 11783.

I am not sure this is King's species as I have not had access to the Thesaurus, but it is certainly not a *Terebratella*, though it resembles *T. dorsata* externally.

Shell dull reddish brown, solid, transversely ovate; neural valve strongly bicarinate, emarginate, provided with about 28 strong, sharp, divaricate, radiating ribs or plications somewhat imbricated by the lines of growth. Margin of the valves strongly flexuose. Neural valve somewhat arched by the carinæ, otherwise the shell is moderately compressed. The beak is short and wide, false area smooth, except for lines of growth, and carinated at the edges; wide and narrow; deltidia long, narrow and slightly separated. Apex slightly recurved, foramen circular, incomplete. Apex of hæmal valve flattened, nucleus acute but inconspicuous. Cardinal process prominent, bifid, excavated at its extremity; hinge plate moderate, excavated, centrally grooved and laterally bicarinate; from the carinations spring the apophyses. Beneath the hinge plate there are two cavities, one on each side of the septum, extending into the beak. The mesial ridge, deeply grooved above, extends from the septum under the hinge plate to the middle of the shell, when the true septum rises abruptly. It is slender, angulated and extending obliquely forward meets the hæmal processes, which give off a triangular web of shelly matter to its upper edge. Leaving the hinge plate at the terminations of the lateral carinations, two short, slender, pointed crura are curved inward, and the hæmal processes curve roundly, to meet the septum as before described.

They are of the most extreme tenuity. The apex of the septum is a small, triangular knob, from which a large thin loop is directed posteriorly. In the specimen this is not quite perfect, but the loop when perfect is evidently entire.

The interior of the neural valve is broadly sulcate on each side of a faint mesial ridge, the sulcations corresponding to the carinæ. The muscular impressions are close in near the cavity of the beak. There is a sharp ridge or septum just inside of the foramen from one side of it to the other.

The punctures are very large, circular, and under the glass recall the cells of Polyzoa. The margin of the valves is sharply crenulated from the extremities of the external plications.

The nearest ally of this species is *Magasella Evansii*, from which it is readily distinguished by its form, color, foramen, sharp plicæ, form of the septum and other minor details. It best agrees with the description of King's species.

Length 1·04 in., breadth 1·03 in., diameter ·52 in.

MAGASELLA (? var.) LÆVIS, Dall. Pl. vi, fig. 9, 10, 13.

*? Terebratula Malvinæ*, D'Orb., Voy. Am. Merid. v, p. 674, No. 779, ix, pl. 85, f. 27, 29.

*Hab.* Orange Harb., Patagonia. Smithsonian Cabinet, 11,782.

Shell perfectly smooth except for the light, but beautifully regular, rounded, concentric lines of growth. Outline nearly circular, beak somewhat produced, slightly recurved, with a large incomplete horse-shoe-shaped foramen. The false area sharply carinate and separated from the deltidia by a deep groove. The deltidia are short, moderately wide and widely separated. Shell not inflated, of a horn color, and conspicuously punctate. Margin of the valves straight, without any indentation or flexure. Teeth and sockets slender and weak, the whole texture of the shell being exceedingly delicate and papyraceous.

The cardinal process is hardly perceptible. The hinge plate is very thin, excavated, and covers the posterior end of the mesial ridge which divides the cavity of the beak below the hinge plate into two parts. The crura are very short and delicate, the hæmal processes at first slender, rapidly widen, throwing off a triangular lamina of shelly matter from the inner sides which reaches the septum and become consolidated with it between the anterior and posterior edges, so that the posterior edge of the septum forms a wall between the two triangular laminæ. In the last species the edge does not project above the lozenge-

shaped plate formed by the two laminæ, and in *? Magas patagonica* there is only a rounded ridge between them. The septum is broad, arising close to the hinge plate, obliquely forward, and is truncate at its extremity, which touches the opposite valve. The reflected loop is broad and quite circular. The cardinal muscles are attached in the apical cavity of the neural valve. The peduncle is short and stout, the other muscles are very slender.

Length ·34 in., breadth ·32 in., diameter ·16 in.

A single specimen was found adhering by its peduncle to a large specimen of *Waldheimia venosa* from Orange Harbor, Patagonia. ?"Les isles Malouines," D'Orb., l. c.

It is not unlike, in general appearance, a very minute specimen of *W. venosa*, except that the foramen is much larger, incomplete and of a different shape. It may be identical with D'Orbigny's species, of which the apophyses are not figured, but differs in its small size and rounded form.

The other species of the genus are as follows:

*Magasella Spitzbergensis*, Davidson, P. Z. S. 1852, p. 78. Rve. Conch. Ic. pl. vii, fig. 24.

Some specimens marked "*T. Labradorensis*," in the Museum of the Philadelphia Academy, but agreeing with Reeve's figure and descriptions, have the typical loop of *Magasella*.

*Hab.* North Atlantic and Arctic seas, Murray Bay; Gulf of St. Lawrence, P. P. Cpr.

*Magasella Cumingii*, Davidson, P. Z. S. 1852, p. 78, pl. xiv, fig. 10—16. Reeve, Conch. Ic. pl. viii, f. 29.

*Habitat.* New Zealand.

*Magasella crenulata*, Sby., Thes. Conch. i, p. 358, 1846, pl. 71, fig. 96—98.

This species resembles *? Magas patagonica*, Gld., and they may prove identical upon comparison.

*Habitat.* "Santa Cruz, Canaries, Cuming," *teste* Rve., apparently with doubt.

## Section KRAUSSININÆ.

Loop entirely absent, apophysary system consisting of two lamellæ attached to the prominent mesial septum of the hæmal valve, and laterally extended.

The external characters of the two genera which compose this section, differ widely; but we have seen that these external attributes are of little value, even in the same genus, in many cases,

and hence the evident relations of the apophyses will outweigh the former in determining the arrangement of the genera. Even in this manner far less violence is done than if we regarded them both as sub-genera of a single heterogeneous group.

Genus KRAUSSINA, Dav.

*Kraussina*, Dav., An. Nat. Hist., 1861, p. 39. Bronn. Malacozoa, iii, part i, pp. 304, 306, 309. Martens Zool. Rec., 1864, et seq.

*Kraussia*, Dav., An. Nat. Hist. ix, p. 369, 1852. Woodw. R. and Fos. Shells, p. 219. Dav. Int. Brit. Brach. p. 69. H. and A. Adams, Gen. Rec. Moll. ii, 578. Gray, B. M. Cat. p. 109. Rve., Conch. Icon. pl. ix. Journ. de Conchyl. 1861, p. 131. Dav., An. Nat. Hist. vol. 16, p. 430, 1855. Chenu. Man. de Conchyl. vol. ii, p. 206. Nom. preöc. teste Davidson.

*Terebratula*, (*capensis*), Krauss., Sud-Afr. Moll. 1848.

Shell with a straight hinge line, truncated beak and large incomplete foramen. Both valves possessing a more or less marked false area. The umbo of the neural valve is separated from the foramen by a more or less prominent septum. Shell structure conspicuously punctate. In the hæmal valve a mesial ridge extends from the apex to the centre of the shell: at its anterior extremity it is projected upwards, forming a stout process bearing two lateral processes, which are somewhat angulated, sometimes bifid, and are extended toward the margin of the valve anteriorly. The brachia are very small, the central spiral lobe minute, and the mouth is situated behind the brachia. Pedicel muscles leaving a strong impression on the hinge line of the hæmal valve.

Fig. 17.

Fig. 17. *Kraussina rubra*, hæmal valve. $\frac{2}{1}$.

*Type*. *Kraussina rubra*, Pallas, fig. 17.

*Kraussina rubra*, Dav., An. N. H. 1861, p. 39.

*Anomia rubra*, Pall., 1766, Misc. Zool. pl. xiv, fig. 2, 11.

*Anomia striata*, Chemn. viii, p. 94, pl. 77, fig. 703.

*Anomia capensis*, Gmel., S. N. p. 3347. Dillw., Rec. Sh. i, p. 292.

*Terebratula rubra*, Blainv., Dict. Sci. Nat. liii, p. 138. Sby., Thes. Conch. vii, pl. 68, fig. 10.

*Terebratula capensis*, Krauss, Sub. Afr. Moll. p. 32, pl. ii, fig. 10. (Not of Ad. and Rve.,) Voy. Sam. p. 71, pl. xxi, fig. 4.

*Kraussia rubra*, Dav., An. Nat. Hist. 1852, p. 370. Gray, B. M. Cat. p. 109, (fig. 19, not 20). H. and A. Adams, Gen. Rec. Moll. ii, p. 579. Rve., Conch. Icon. pl. ix, fig. 37, a, b, c. Journ. de Conchyl. 1861, p. 131. Chenu, Man. de Conchyl. vol. ii, p. 206, fig. 1056, 1058.

*Terebratula rotundata*, Blainv., fide Reeve.

*Hab.* Cape of Good Hope, "Orange Harb.," U. S. Ex. Ex. Smithsonian cabinet, 17817.

The attachments of the pedical muscles in this species are very large and strongly impressed. The septum or mesial ridge is rather faint. The cardinal process is moderate. The terminations of the apophysary arms are somewhat spatulate. The form is frequently distorted and very variable. The neural valve is usually the most inflated. The apical septum is most evident in small specimens, becoming eroded in very large or old specimens. The foramen extends behind the carination of the area. The teeth are not supported by laminæ. The mantle adheres closely to the shell at the margin, and the muscles are very stout and strong. The ovaria are widely ramified. Setæ were not observed in the mantle-edge of dried specimens.

Fig. 18.

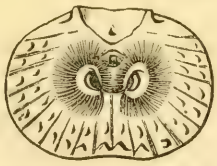


Fig. 18. *Kraussina Lamarckiana*, hæmal valve with animal.

KRAUSSINA LAMARCKIANA, Dav., fig. 18.

*Kraussia Lamarckiana*, Dav., An. Nat. Hist. 1852, p. 370. Proc. Zool. Soc. 1852, p. 80, pl. xiv, fig. 22, 23. Gray, B. M. Cat. p. 111, fig. 20 ? H. and A. Adams, Gen. Rec. Moll. ii, p. 579. Chenu, Man. de Conchyl. ii, p. 206, fig. 1057.

*Kraussina Lamarckiana*, Dav., An. N. Hist. 1861, p. 39.

*Hab.* Sidney, Australia. Newcomb.

This pretty little species is very poorly represented by Gray's

figure, which gives a very erroneous idea of the hinge line. Chenu's figure is better, but the cardinal process is too prominent, and the area below the hinge line quite incorrect. The cardinal process is hardly perceptible at all, the septum is prominent and grooved on the upper edge. The apophysary processes are broad and folded together, having a sulcate or bifid appearance; the interior edges are approximated and the exterior edges are somewhat produced into a rounded point. On opening a dried specimen I could detect no central spiral lobe; this may have been owing to the condition of the individual. The interior of the shell is prettily marked with eight or ten radiating rows of tubercles on each side, and is very conspicuously punctate. The transverse ridge or septum, in the apex of the neural valve, is well marked in my specimens. The neural valve is emarginate anteriorly, and the margin of both valves is consequently somewhat flexuous. The pedicel muscular scars are minute, but perceptible. The other species of this genus are:

*Kraussina cognata*, Chemn., Dav. An. Nat. Hist. 1852, p. 370.

*Hab.* South Africa.

*Kraussina pisum*, Lam., (Val.) Hist. Nat. An. s. Vert. 2d ed. vii, p. 330, = *Terebratula natalensis*, Krauss.

*Hab.* South Africa.

*Kraussina capensis*, Ad. and Rve., Zool. Samarang, p. 71, pl. 21, fig. 4. = *Kraussia Deshayesii*, Dav.

*Hab.* Cape of Good Hope.

This species was named *capensis* by Ad. and Rve. The name was admissible, as Gmelin's *capensis* is a synonym of *rubra*, Pallas. It was afterward described by Mr. Davidson as *K. Deshayesii*, which name, for the above reasons, must stand as a synonym. The species is, very probably, identical with *Kraussina rubra*, and I doubt if *Kraussina pisum* and *K. cognata* are not also different ages of one species. The denticulated margin mentioned by Reeve as peculiar to *cognata* is probably an individual peculiarity, and similar to the marginal tubercles in old and thickened specimens of *Megerlia truncata*.

*? Kraussina picta*, Val., Verh. Zool. Bot. Ges. Wien, 1865, p. 894.

*Hab.* St. Paul Island, Indian Ocean.

Genus BOUCHARDIA, Dav.

*Terebratula*, Blainv., Dict. Sci. Nat. liii, p. 145, 1828.

*Bouchardia*, Dav., Bull. Soc. Géol. de France, vol. vii, 1849, p. 62, pl. i.; An. Nat. Hist. 1852, p. 372. King, Perm. Foss. p. 81, 1850. Gray, B. M. Cat. p. 100. H. and A. Adams, Gen. Rec. Moll. ii, p. 557. Chenu, Man. de Conchyl. ii, p. 207. Woodw., Rec. and Foss. Shells, p. 218. Rve., Conch. Icon. pl. viii; Journ. de Conchyl. 1861, p. 130. Dav., Int. Brit. Brach. p. 70; An. Nat. Hist. 1861, p. 38.

Shell with a nearly straight beak, apically foraminated with a small circular perforation. No true area or deltidium. Hinge-plate large, solid, provided with Λ-shaped diverging ridges, probably for the attachment of the cardinal muscles. Socket ridges of the hæmal valve largely developed, and fitting into corresponding furrows in the neural valve. There is no cavity beneath the hinge-plate; from its base a not prominent median septum arises, reaching beyond the middle of the shell, and bearing two pointed, lateral, posteriorly recurved processes. Muscular scars in the neural valve, subcentral and divided by a mesial ridge.

Fig. 19.

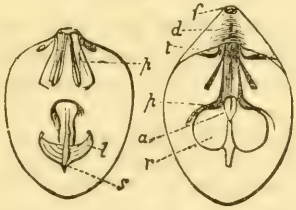



Fig. 19. *Bouchardia tulipa*, interior of both valves. *f*, foramen; *d*, deltidium; *t*, dental sockets; *r*, cardinal scars; *a*, adductor scars; *p*, peduncular muscle scars; *s*, septum; *l*, lateral processes of septum.

*Type*. *Bouchardia tulipa*, Blainv., fig. 19.
*Terebratula tulipa*, Blainv., Dict. Sci. Nat. liii, p. 144, 1828.
*Terebratula rosea*, Mawe, Int. to Conch. 1823? Sby., Gen. fig. 4; Thes. Conch. vii, p. 357, pl. lxxi, figs. 74, 75, 76, 77. Deshayes, in Lam. 2nd. Ed. Hist. des An. s. Vert. vii, p. 350. King, An. and Mag. Nat. Hist. 1846, pp. 34, 38.
*T. unguis*, Kuster, Conchyl. Cab. vii, p. 35, fig. 8—10, 1842.
*Pachyrhynchus roseus*, King, Perm. Foss. p. 70.
*Bouchardia rosea*, Dav., Bull. Soc. Géol. de France, vol. vii, p. 62, pl. i, figs. 1 to 6. King, Perm. Foss. p. 81.
*Bouchardia tulipa*, Dav., 1851, Int. Brit. Brach. p. 70, figs. 17, 18, pl. vi, figs. 22—25. Woodw., Rec. and Foss. Sh. p. 218, fig. 118. Gray, B. M. Cat. p. 101, figs. 13, 14.

Rve., Conch. Icon. pl. viii, fig. 33; Journ. de Conchyl. 1861, p. 130. H. and A. Adams, Gen. Rec. Moll. p. 577, pl. 131, figs. 2, 2a. Chenu, Man. de Conchyl. ii, p. 208, figs. 1061—1063.

*? Bouchardia fibula*, Rve., Conch. Icon. vii, fig. 30 a, b.

*Hab.* Rio Janeiro, 13 fathoms, McGillivray.

This very remarkable shell is well distinguished from the last genus in the form of the neural umbo, the cardinal process and hinge-plate, and the apophyses, which principally differ from *Kraussina* in being posteriorly instead of anteriorly directed. The figure given by Woodward and Gray gives a poor idea of it. A much better one may be found in Davidson's introduction to the classification of the Brachiopoda, plate vi. The area where the deltidium should be is flat or excavated.

The other species, referred by Reeve to this genus, does not belong to it.

The genus is only known in a recent state.

## Section PLATIDIINÆ.

Shell with the loop attached, not reflected; animal with sigmoid brachia meeting behind the mouth, without any spiral median lobe or lateral loops. Cardinal process absent.

### Genus PLATIDIA, Costa.

*Platidia*, O. G. Costa, Fauno del Reg. Napoli, Jan. 1852, p. 47.

*Morrisia*, Dav., An. Nat. Hist. May, 1852, p. 371. Woodw., Rec. and Foss. Shells, p. 218. Rve., Conch. Icon. pl. x; Journ. de Conchyl. 1861, p. 134. Dav., An. Nat. 1861, p. 39. Bronn, Malac. iii, pt. i, pp. 304, 306, 309. Chenu, Man. de Conchyl. p. 208. H. and A. Adams, Gen. Rec. Moll. ii, p. 579.

Shell with a large foramen encroaching upon both valves, ventral valve with a small straight area, deltidia absent or rudimentary, valves articulated by teeth and sockets, structure coarsely punctate. Apophysary system reduced to two short arms provided with crura, proceeding from the hinge margin and attached to a small central septum.

In the last section the hæmal processes were absent and the neural portion of the loop, in a modified form, present. In this section the reverse is the case.

Fig. 21.

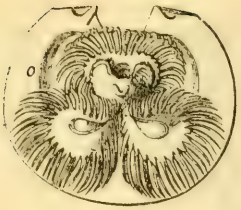



Fig. 20.

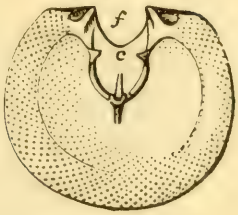



Fig. 20. *Platidia anomioides*, hæmal valve with animal. $\frac{1.0}{1}$.
Fig. 21. Same. *f*, pedicel notch; *c*, apophyses; *o*, ovaries.

*Type.* *Platidia anomioides*, Scacchi, sp., fig. 20, 21.

*Terebratula anomioides*, Scacchi, Phil. Moll. Sicil. ii, p. 69, pl. xviii, fig. 9 (1844).

This species is equal to *appressa*, Forbes, + *seminulum*, Dav. (not *T. seminulum*, Phil.), and possibly + *eusticta*, Phil. (?)

*Hab.* Mediterranean, living, 95 fathoms, and fossil (*eusticta*) in the pliocene of Palermo.

If the last mentioned species is really synonymous with *P. anomioides*, as some authors have suggested, the former name will have to take precedence, as it was published in 1836.

The other recent species of *Platidia* are:

*Platidia lunifera*, Phil., 1836, Moll. Sicil. i, p. 97, pl. vi, fig. 16.

*Platidia Davidsoni*, Deslongchamps, An. Nat. Hist. 1855, xvi, p. 443, pl. x, fig. 20, a, b, c, d.

Both of the above species are found in the Mediterranean.

*?Platidia gigantea*, Desh., Maillard, Moll. Isl. Bourbon, 1864.

*Hab.* Isle de Bourbon, S. Ocean.

## Section MEGATHYRINÆ.

*Argiopidæ*, King, Perm. Foss. p. 142.

Shell with a straight, wide hinge-line; apophyses consisting of a submarginal loop, attached at the hinge margin and provided with crura, intersected by one or more submarginal elevations or septa.

Brachia submarginal, surrounding a smooth disk or membrane, in the middle of which the mouth is situated. Pedunculated.

Fig. 22.

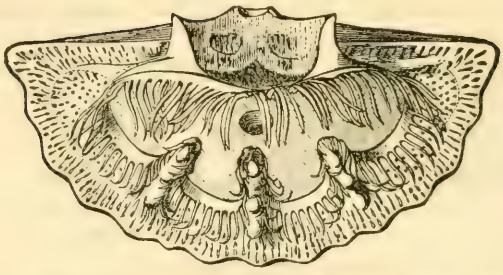


Fig. 22. *Megathyris decollata*, $\frac{4.0}{1}$, hæmal valve and animal.

Genus MEGATHYRIS, D'Orb.

Mantle adherent to the shell. Foramen and area large.

Subgenus MEGATHYRIS, D'Orb.

*Megathyris*, D'Orb., Pal. Fran. Ter. Cret. 1847, p. 147. Prod. ii, p. 259. An. Sci. Nat. 1848.

*Argiope*, Desl., 1842 (not Savigny), Mém. Linn. Soc. Normandie vol. vii, p. 9; Bull. Soc. Géol. Fran. vii, 2nd Series, p. 65. Dav., Int. Class. Brit. Brach. p. 72; Mem. Lin. Soc. Normand. vol. x, 1856, p. 137; P. Z. S. 1852, p. 81; An. Nat. Hist. 1852, p. 372, 1861, p. 39. Rve., Conch. Icon. pl. x; Journ. de Conchyl. 1861, p. 135. Woodw., Rec. and Foss. Shells, p. 220. Chenu, Man. de Conchyl. ii, p. 209. H. and A. Adams, Gen. Rec. Moll. ii, p. 580. Bronn, Malac. iii, pt. i, pp. 304, 306, 309.

*Orthis*, sp. Phil., Hagen. Mich., not Dalman.

*Terebratula*, Lam., Blainville, &c. (sp.)

*Anomia*, Chemn., Gmel., Muhlf., &c. (sp.)

Shell transversely oblong, or semicircular; smooth or ribbed with more or less prominent radiations; strongly punctate; hinge-line wide; area flat; foramen large, triangular or rounded; deltidium absent or rudimentary; interior of hæmal valve furnished with from three to five, or more, rounded submarginal septa, over which the broad loop is bent and attached. The brachia are continuous and follow the course of the loop, and hence appear four-lobed. The cardinal process is large and strong, centrally excavated. The interior of the shell is pustulose.

The name *Argiope* was proposed in 1827 by Savigny and Audouin (Descr. de l'Egypt, ed. ii, xxii, p. 334, pl. ii, fig. 6), for a genus of Egyptian spiders, typified by *Aranea lobata*, Pall.

(*A. sericea*, S. and A.) This genus was properly characterized, and is still in use. It has fifteen years' precedence over *Argiope*, Desl., which necessarily becomes a synonym of the next regularly proposed generic name applied to this group. This is *Megathyris* of D'Orbigny, 1847, which must therefore be adopted. For information in regard to Savigny's genus, see Thorell, Ann. and Mag. Nat. Hist. 1868, p. 190.

Fig. 23.

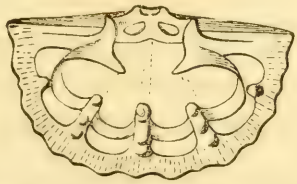


Fig. 23. *Megathyris decollata*, $\frac{4}{1}$, showing the apophyses.

*Type. Megathyris decollata*, Chemn., sp. fig. 22, 23.
*Anomia decollata*, Chemn., Con. Cab. viii, p. 96, pl. 78, fig. 705.

This is *Anomia detruncata*, Gmel., + *Terebratula decollata*, Desh., + *T. aperta*, Blainv., + *T. dimidiata*, Scacchi, + *T. cardita*, Risso, + *T. urna-antiqua*, Risso, + *Argiope decollata* of Dav., Rve., and most modern authors.

As Chemnitz was not a binomial writer, it is probable that his specific name ought to give place to that of Gmelin.

*Hab.* Mediterranean, living; fossil in the miocene of Gibraltar and pliocene of Calabria.

### Subgenus Cistella, Gray.

*Cistella*, Gray, B. M. Cat. Jan. 1853, p. 114. H. and A. Adams, Gen. Rec. Moll. ii, p. 581 (not *Cistelia*, Geoffr. and Fabr. Coleop.)
*Zellania*, Moore, Proc. Somerset Archæol. and Nat. Hist. Soc. 1854. Dav., Mem. Lin. Soc. Normandie 1856, p. 141, pl. vii (type, *Z. Davidsoni*, Moore, figs. 43, 44). Chenu, Man. de Conchyl. ii, p. 210.

Shell with a single median submarginal septum and bilobed loop. Surface smooth, or radiately ribbed. Brachia interrupted by the septum.

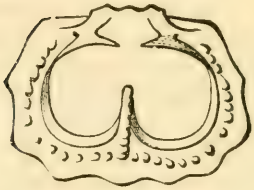


fig. 24.

Fig. 24. *Cistella neapolitana*, $\frac{8}{1}$, hæmal valve and apophyses.

*Type*. *Cistella cuneata*, Risso, sp.
*Terabratula cuneata*, Risso, Eur. Merid. 1826, fig. 179.

*Hab*. Mediterranean, living.

This is the *Terebratula detruncata*, Scacchi (not Gmelin), + *T. soldaniana*, Risso, Blainv., + *Anomia pera*, Muhlf., + *Orthis pera*, Phil., + *Argiope cuneata* of most modern authors.

The remaining recent species of *Cistella* are:

*Cistella Neapolitana*, Scacchi, sp., Oss. Zool. 1833, ii, p. 18. Dav., Ann. and Mag. Nat. Hist. 1861, p. 40.

*Hab*. Mediterranean, living and fossil in the pliocene of Tarentum.

This is the *T. seminulum*, Phil. (not Dav.), *T. lunifera*, Sby. (not Phil.), and the *Argiope Forbesii*, Dav.

*Cistella cistellula*, S. Wood, sp., An. Nat. Hist. 1840, 5. Dav., Ann. and Mag. Nat. Hist. 1861, p. 40.

*Hab*. Zetland, and the north-west coast of Europe.

*Cistella Barrettiana*, Dav., P. Z. S. 1866 (Feb.), p. 103, pl. xii, figs. 3, 3a, b, c.

*Hab*. North-east coast of Jamaica, 140 fms.

*? Cistella antillarum*, Crosse and Fischer, Journ. de Conchyl. (March) 1866, p. 270, pl. viii, fig. 7, two views.

*Hab*. Guadeloupe, W. I., 125 fms.

This is perhaps identical with the preceding species.

*Cistella Woodwardiana*, Dav., P. Z. S. (Feb.) 1866, p. 103, pl. xii, figs. 4, 4a, b, c.

*Hab*. North-east coast of Jamaica, 60 fms.

*Cistella Schrammi*, Crosse and Fischer, Journ. de Conchyl. (March) 1866, p. 269, pl. viii, figs. 6, 6.

*Hab*. Guadeloupe, W. I., 125 fms.

This species would seem, from the figures of Messrs. Davidson and Crosse, to be quite distinct from *C. Woodwardiana*, yet it is possible that one of them may inadequately represent the shell, and the two prove identical. In this case, Mr. Davidson's name has a few weeks' priority.

It is singular that the descriptions of these last mentioned species should have been first published, almost at the same moment, by different authors, especially as new species of *Megathyris* are by no means common.

## ? Family THECIDIIDÆ.

*Thecidæ*, Desh., En. M. iii, 1836.

Shell (perforate when young ?) attached by the neural valve when adult.

Brachia lobed, not spiral, shell articulated by teeth, sockets, and a cardinal process.

Disk grooved or excavated for the reception of the brachial lobes. Mantle adherent, extending to the margin of the valves; the brachia folded upon themselves and supported by a complicated calcareous network secreted by the mantle. Loop absent, except the crura, which usually are united behind the mouth, forming an arch over the viscera; but are occasionally blended with the surrounding calcareous matter.

Soft parts with the mantle united behind. Sexes separated. Female provided with a nidamental sac, in which the embryos are incubated, after passing out of the perivisceral cavity through the oviduct, and becoming attached to two specially modified brachial filaments, the ends of which are inserted in the marsupium. Intestine cæcal. Mantle margin without setæ. Embryos transversely segmented, covered with vibratile cilia, provided with two or four ocular spots on the anterior segment, and strongly resembling the embryonic *Pneumodermon*. Adults sensible to the light. Perivisceral fluid colorless.

### Genus THECIDIUM (Defr.), Sby.

*Thecidea*, Defr., 1828, in Fer. Tab. Syst. p. 38.
*Thecideum*, Lacaze-Duthiers, Ann. Sci. Nat. Zool., T. xv, 1861, p. 262.
*Thecidium*, Sby. (emend.), Gen. Shells 1844, xx.
*Thecidium*, Dav., Int. Brit. Brach. p. 77 ; Mém. Lin. Soc. de Normandie 1856, p. 145. Suess, Ibid. p. 45. Deslongch., Ibid. p. 61, and most modern authors.

Shell thick, punctate, rounded or oval, more or less regular. Neural valve somewhat produced and perforated by a minute

apical foramen, usually closed at an early age. Hinge area flat, triangular; deltidium triangular, hardly distinguishable from the area; interior deeply concave, furnished with two prominent cardinal teeth. Brachia often irregular, separated by a median ridge from which other ridges branch out, often unsymmetrically. In the excavations between these ridges the brachia are placed like a fringe upon the mantle.

Hæmal valve furnished with a prominent cardinal process between the sockets, and this process is frequently broadly channelled. Just before it is the cavity for the viscera, which is often overshadowed by the calcareous network which supports the mantle.

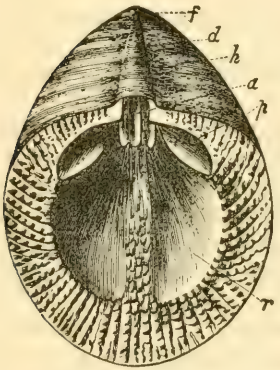



Fig. 25.

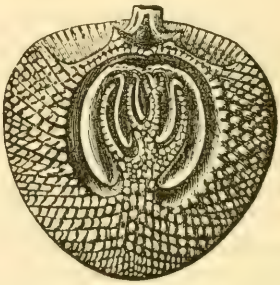


Fig. 26.

Fig. 25. *Thecidium radians*, neural valve: *f*, rudimentary foramen; *d*, deltidium; *h*, hinge area; *a*, cavity for adductor; *p*, dental sockets. $\frac{4}{1}$ nat. size.
Fig. 26. Hæmal valve of the same. $\frac{4}{1}$ nat size.

*Type.* *Thecidium pumilum*, Val., apud Lam. sp. 1819; Hist. Nat. p. 58. Dav., An. Nat. Hist. 1850, pl. xiv, fig. 58. =*Thecidea radiata*, Defr., Fer. Tab. Syst. 38, 1821, + *T. papillata*, Bronn.

Fossil, cretaceous beds of Europe.

After a careful study of the admirable plates of M. Deslongchamps, with the paper of M. Suess which accompanies them, as well as of the observations on the genus by Messrs. Davidson, Deslongchamps and others, I am compelled to dissent entirely from the views of those naturalists in regard to the homologies of the internal calcareous network which is so remarkable in *Thecidium*.

I can see no grounds for considering this network as equivalent to the loop of *Megathyris* or any other genus of the *Terebra-*

*tulidæ*. The only portion of the internal structure of *Thecidium* which seems clearly homologous with any part of the loop of *Megathyris*, is the "bridge," so called, which, it may be supposed, is equivalent to the crura of the last-named genus, united and thickened. The loop of the *Terebratulidæ* appears to me to be entirely absent, while the brachia are supported in a totally different manner in the present group.

Instead of the brachia being supported by a calcareous loop of constant shape and (relative) size, as in all the genera of the *Terebratulidæ*, they appear in *Thecidium* to be more or less intimately attached to the mantle itself. This part of the mollusk is well known to be extremely variable in its form and extent. In some genera, such as *Terebratella*, we find the edge of the mantle varying in form during different stages of the same individual, as is evident by the smooth surface, radiating ribs or concentric striæ which mark different parts of the surface of the same shell. In some, we find that the mantle has been unsymmetrical, one side being more developed than the other, while in other specimens again we find more or less development of some portion of the margin, while other portions are abnormally retarded in their growth. These cases are marked by excessive lateral or mesial extension of the shell, with corresponding compression of the mesial or lateral margins.

The mantle consists in the *Brachiopoda* of two laminæ, the one adhering to the shell and apophyses, and the other forming a coat for the arms and adhering to the former. The two lobes corresponding to the two valves are united only at the base of the peduncle, where they form the visceral cavity.

M. Eudes-Deslongchamps, in an extremely interesting paper (Mem. Lin. Soc. de Normandie, 1864), has described the calcareous spiculæ which exist in the mantle of all the genera of *Terebratulidæ*, and shown to what an extent they are produced in old individuals. Now, I believe that the mantle of *Thecidium*, in the absence of apophyses such as serve for its support in other genera, is upheld by an extraordinary deposition of such spiculæ, in the form of a network more or less consolidated, which varies in form with the variations of the mantle, often unsymmetrical on the two sides of the same individual.

That this calcareous deposit is not homologous with the loops of other genera, is shown by the fact that in those genera the spiculæ exist, in greater or less amount, independently of the loop, which is constant in its form, while in *Thecidium*, which has no loop, although the general form of the soft parts much resembles the same parts in *Megathyris*, they are deposited by the variable lobes of the mantle, and serve as its only sup-

port. Both the neural and hæmal lobes secrete those deposits, which in old specimens, as shown by M. Deslongchamps, often obliterate the mesial ridge and form a solid bed of calcareous matter. Now the loop of other genera is only found upon the hæmal valve, it does not increase in (relative) size with age, nor become abnormally calcified or thickened.

Again, we find no submarginal loop in the neural valve of other genera, with which the submarginal calcareous deposits which exist in the neural valve of some species of *Thecidium* can be homologized. (See Davidson, Mem. Lin. Soc. de Norm. p. 153, pl. viii, fig. 15, *T. vermiculare*).

These facts show that no true homology exists between the two formations. Mr. Davidson (in Mem. Lin. Soc. de Norm.) in his classification of the *Brachiopoda*, hints at this view of the matter, which has been made clear by the further researches of M. Deslongchamps. The resemblance between the lobed structure of *T. digitata* and the loops of *Megathyris decollata*, is due to a similar form of the soft mantle edge in both, and by no means justifies the deductions of M. Suess in his paper on the internal structure of the *Thecidiæ*.

The spiculæ are frequently deposited upon the hinge margin and crura, which has led to further misconception, and induced the belief of the identity of the two dissimilar structures.

I would add that I consider the gap between this section and the others as far wider than between any two other sections of the group, and that no sufficient reasons have yet been adduced for uniting the family *Thecidiidæ* with the *Terebratulidæ*. Nevertheless, for the present, I would defer to the opinions of the learned naturalists previously mentioned. I think sufficient information has hardly been brought forward to justify the opinion of Lacaze-Duthiers that *Thecidium* in its young state is not pedunculate. Judging by analogy, it certainly should be; and if it is not, it would almost be a sufficient reason of itself for separating the group as a separate family.

M. Suess divides the group into five lesser groups, typified respectively by *T. hippocrepis*, Goldf., *T. papillata*, Schloth., *T. digitata*, Sby., in the cretaceous beds; *T. triangularis*, D'Orb., and *T. sinuata*, Desl., from the Great Oolite and Liassic strata.

M. Deslongchamps proposes an arrangement of six groups, typified by *T. Perieri*, E. Desl., *T. mayalis*, E. Desl., *T. sinuata*, E. Desl., *T. triangularis*, D'Orb., *T. papillata*, Schloth., and *T. digitata*, Sby.

In the present state of our knowledge of the subject I am not convinced that any of these groups are sufficiently well marked to constitute subgenera. The only recent species of *Thecidium* are:

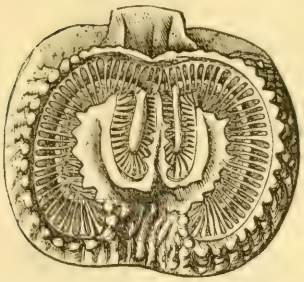


Fig. 27.

Fig. 27. *Thecidium mediterraneum*, hæmal valve with the animal, four times the natural size. From a specimen in the collection of Thos. Davidson, Esq.

*Thecidium Mediterraneum*, Sby., Thes. Conch. vii, p. 371, pl. 73, fig. 30–32. Lacaze-Duth., loc. cit., p. 262, pl. i—iv.

This species is found attached to corals in the Mediterranean. It is the *T. testudinaria*, Michel., and the *T. spondylea*, Scacchi. It has also been found in Jamaica.

*Thecidium Barretti*, Woodw., Geol. Mag. 1864, i, pl. ii, fig. 1—3. Dav., P. Z. S. 1866, p. 104.

This species, first described from fossils, has been found living on the coast of Jamaica, at 60 fathoms.

## Family *RHYNCHONELLIDÆ.*

### Genus RHYNCHONELLA, Fischer.

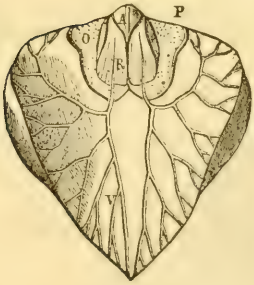



Fig. 28.

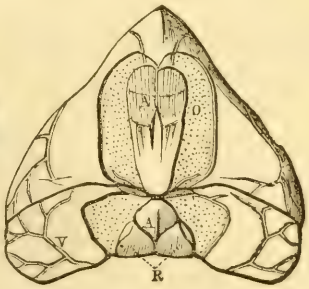



Fig. 29.

Fig. 28. Neural aspect of *Rhynchonella acuminata*, fossil, from a cast, showing vascular impressions.

Fig. 29. Umbonal aspect of the same. A, adductor scar; R, cardinal; P. pedicel; V, vascular; O, ovarian impressions.

*Rhynchonella*, Fischer, Not. des Fos. du Gouv. de Mosc. 1809.

*Type.* *Rhynchonella loxia*, Fischer, Dav. Int. Brit. Brach. pl. vii, fig. 99—107.

It is very desirable that the structure of the crura in this species should be examined, as it is very probable that it may prove quite different from that of the recent species now generally known by the name of *Rhynchonella*.

The recent species of this genus are:

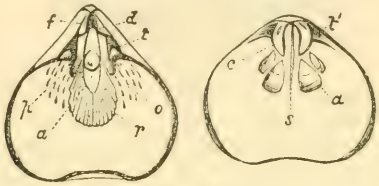



Fig. 30.

Fig. 30. Interior of valves of *Rhynchonella psittacea*; *s*, septum; *f*, foramen; *d*, deltidium; *t*, teeth; *t'*, sockets; *c*, oral lamellæ; *a*, adductor scars; *r*, cardinal do.; *p*, pedicel do.; *o*, ovarian spaces.

Fig. 31.

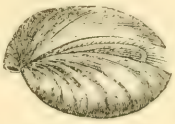


Fig. 32.

Fig. 33.

Figs. 31—33. *Rhynchonella psittacea*, living, after Barrett. The arms appear never to be exerted any further beyond the shell.

*Rhynchonella psittacea*, Gmelin, Rve. Conch. Icon. pl. i, fig. 2 a, b, c.

*Hab.* Boreal and Arctic Seas.

Fig. 34.

Fig. 34. *Rhynchonella nigricans*, Sby.; *a*, adductors; *i*, cæcal end of intestine

*Rhynchonella nigricans*, Sby., Thes. Conch. i, p. 342, pl. 71, fig. 81, 82.

*Hab.* New Zealand and adjacent seas.

*Rhynchonella Grayi*, Woodw., An. and Mag. Nat. Hist. 1855, p. 444, pl. x, fig. 16 a, b, c.

*Hab.* Feejee Islands.

*Rhynchonella Woodwardii*, A. Adams, An. and Mag. Nat. Hist. 1863, p. 100, No. 2.

*Hab.* Rifunsiri, 35 fms.; Gotto, 48 fms.; Japan.

*Rhynchonella lucida*, Gld., Proc. Bost. Soc. Nat. Hist. 1860, p. 323. Otia Conch. p. 121.

*Hab.* Japan coast, 110 fathoms.

The above list is given for the convenience of students.

## Family *LINGULIDÆ.*

### *Synopsis of Characters.*

*LINGULIDÆ.*—Shell pedunculate, peduncle passing between the valves; inarticulate, subequivalve containing phosphate of lime. Brachia lateral, subspiral, symmetrical without apophyses.

LINGULINÆ.—Posterior-adductor scar, median, single. Shell more or less elongate.

LINGULA.—Elongate; anteriorly expanded, posteriorly tapering; smooth or striated; thin; with a thin epidermis. Substance of the valves impunctate, traversed by excessively minute tubuli. Beaks simple; neural beak more produced. No internal laminæ or apophyses, except a more or less pronounced mesial ridge.

GLOTTIDIA.—Shell with two diverging internal laminæ in the neural valve proceeding from the beak, and a mesial septum in the hæmal valve. Otherwise essentially as in Lingula?

LINGULELLA.—Shell with the neural beak produced and grooved for the passage of the pedicel; rounded triangular.

* TRIMERELLA.—Shell with a longitudinal septum supporting a flat lozenge-shaped plate, serving as a muscular fulcrum, and attached to the valve by its lateral edges.

* ? GOTLANDIA.—Valves distinctly articulated by grooves in

*These two forms somewhat resemble *Obolus* in shape; their muscular impressions are not known, but perhaps they may eventually be placed in the second division of the family.

the hinge plate, and a prominent cardinal process fitting into a semilunar pit below the neural area. Each valve bearing a tubular process on each side of the septum.

LINGULEPIS.—Visceral area neurally tripartite, hæmally flabelliform; post. occl. scars within the visceral area; ant. add. in its anterior sinuses, ant. occl. median.

OBOLINÆ.—Post adductor scars double, more or less separated from the median line. Shell more or less orbicular.

OBOLUS.—Shell orbicular; neural beak short; hinge margin flat; cardinal border grooved for the pedicels. Hæmal beak inconspicuous, valve more or less flattened. Ant. add. scars ovate, converging anteriorly.

OBOLELLA.—Shell with minute area usually grooved. Ant. add. scars diverging anteriorly.

*Kutorgina*.—Hinge line straight, meeting the lateral margins at an angle. Neural valve with an area and foramen. Shell Orthisiniform.

*Monobolina*.—Shell like Obolus, muscular impressions united along the median line.

?SPONDYLOBUS.—Shell suborbicular. Hæmal apex excentric. Valve with a thickened base interiorly. Neural valve with a marginal apex, channelled, and with a thickened hinge line on each side of the groove. Shell structure testaceous, not glossy, fibrous.

## Family LINGULIDÆ, King.

*Lingulidæ*, Dav., Int. Br. Brach. p. 133.

Shell furnished with a peduncle passing between the apices of the valves; inarticulated, subequivalve, composed of horny laminæ alternating with cretaceous layers; containing phosphate of lime; impunctate. Brachia unsupported by calcified processes.

### Section LINGULINÆ.

#### Genus LINGULA, Brug.

*Lingula*, Brug., Ency. Meth. tab. 250, 1789.
*Pharetra*, Mus. Bolt. Ed. ii, p. 111, 1819.

Shell thin, subequivalve, equilateral, tapering at the beaks, expanded at the pallial region. Valves held together by the adductor and pedicel muscles. Beak of the neural valve slightly

more produced and pointed than the other. Surface smooth or concentrically striated, covered with a thin epidermis. Brachia elongated, subspiral, situated on each side of the mouth, externally ciliated. The muscular impressions are light; close to the beak is one formed by the post adductor, two others (*adductores anteriores*) are seen near the middle of the shell; they are divided in the neural valve by a blunt projection, and in the hæmal valve by a mesial ridge. In the neural valve another triangular depression just before the last mentioned, indicates the seat of the insertion of the anterior retractors.

Horny laminæ of the shell permeated by excessively minute tubuli.

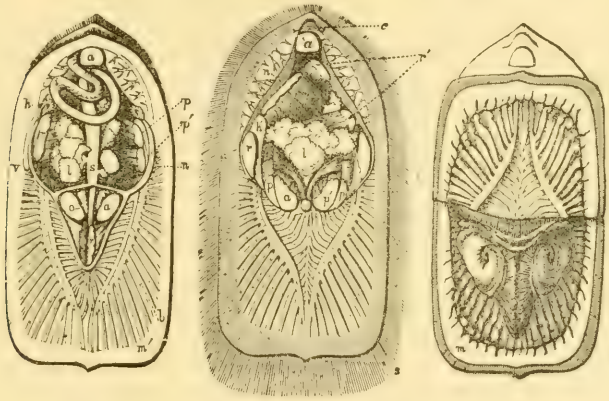


Fig. 35. Fig. 36. Fig. 37.

Fig. 35. Hæmal view of animal of *Lingula anatina*, after Woodward.
Figs. 36, 37. Neural views of same. *aa*, anterior adductors; *a'*, post adductor; *pp*, external protractors; *p'p'*, central protractors; *c*, capsule of pedicel; *nn*, visceral sheath; *o*, œsophagus; *s*, stomach; *l*, liver; *i*, intestine; *v*, vent; *m*, mantle-margin; *s*, setæ; *b*, pallial sinuses and their branches.

*Type.* *Lingula anatina*, Lam., Anim. sans Vert. vol. vii, p. 390.

*Hab.* Moluccas and Philippines.

The peduncle of *Lingula* is not a simple mean of attachment alone as in the *cirrhipedes*, but is mobile and muscular; the animal when detached from its position is able to move it rapidly about, like an arm or fin, and, when attached, by using its support as a fulcrum it can move the shell in various directions with great facility. They prefer sandy or muddy bottoms, into which they would appear to be able to burrow with their peduncle, and remain with only the anterior edge of the valves at the surface of the sand. They are frequently entirely unattached.

The Paleozoic *Lingulæ* may have belonged to the same genus as the recent forms, but it is very probable that many, if not all of them, did not; as we find granulated, radiately striated and otherwise ornamented forms, which differ entirely in this respect from the living *Lingulæ*, the outline of many of the older species also being rounded triangular, and some of them were provided in the neural valve with a sharp elevated mesial septum; these features do not characterize the recent species. The other recent species of *Lingula* are as follows:

*Lingula ovalis*, Rve., P. Z. S. 1841, p. 100.

*Hab.* Sandwich Islands.

*Lingula tumidula*, Rve., P. Z. S. 1841, p. 100.

*Hab.* Moreton Bay, Australia. Japan.

This species, judging from the figure in the Conch. Iconica, differs materially from the other species there figured, in the broad form, emargination of the beaks and the size and position of the muscular impressions. A variety (?) *compressa* is found in the Philippines.

*? Lingula Murphiana*, King, Rve., Conch. Icon. pl. i, fig. 3, 1861.

*Hab.* Moreton Bay, Australia.

This species (?) much resembles *L. anatina*.

*Lingula hirundo*, Rve., Conch. Icon. pl. ii, fig. 7, 1861.

*Hab.* Port Curtis, North-east Australia.

*Lingula exusta*, Rve., Conch. Icon. pl. ii, fig. 9, 1861.

*Hab.* Moreton Bay, Australia.

*Lingula hians*, Swains, Zool. Ill. vol. ii, pl. ii.

*Hab.* China Seas.

*Lingula smaragdina*, A. Ad., An. and Mag. Nat. Hist. 1863, p. 101.

*Hab.* Yobuko, Japan.

*Lingula jaspidea*, A. Ad., An. and Mag. Nat. Hist. 1863, p. 101.

*Hab.* Mososeki, Japan.

*Lingula lepidula*, A. Ad., An. and Mag. Nat. Hist. 1863. p. 101.

*Hab.* Seto Uchi, Japan.

Genus GLOTTIDIA, Dall.

Shell linguiform, elongate, pedunculated; general characters as in *Lingula*. Neural valve provided internally with two sharp narrow incurved laminæ, diverging from the beak and extending about one third the length of the shell; anterior extremities of the laminæ about midway between the mesial line and the margin. Hæmal valve with a mesial septum of about the same length extending forward from the beak. Anterior adductor impressions rounded, separated by a faint mesial ridge, faintly impressed. Scar of the post adductor close in the cavity of the beak, rounded. No other evident scars. Shell smooth, perforate or imperforate.

*Type*. *Glottidia albida*, Dall. Pl. 8, fig. 1—6.

*? Lingula albida*, Hinds, Voy. Sulphur. p. 71, pl. 19, fig. 4. Rve., Conch. Icon. pl. i, fig. 4.

*Hab*. San Diego, Cooper. Santa Barbara, 28 fms., Newcomb. Smithsonian Cabinet, No. 19,416.

Shell creamy white. Smooth and polished except for faint lines of growth, outside. Inside whitish toward the centre, yellowish toward the edge; extreme margin brownish horn color. Interior with faint wrinkles, caused, perhaps, by drying; longitudinally faintly striate at the anterior margin. Mesial ridge very faint, prolonged in a white line upon the yellowish part of the shell near the anterior margin. Laminæ sharp, elevated, with their upper edges inclined inward, not blended in the beak cavity, but continued, closely parallel, to the apex. They probably serve as fulcra for the post parietal muscles. They terminate abruptly, not fading off gradually. Externally, toward the anterior margin, there is a faint mesial ridge which terminates in a small point on the anterior edge of the shell. Peduncle stout, transversely wrinkled, exhibiting two longitudinal ridges with a deep groove between them. Length in the dried specimen about an inch. Neural valve ·94 in. long by ·48 in. wide at the broadest part. Distance between the extremities of the laminæ ·26 in. Height of the latter above the shell ·02 in.

A single neural valve with the peduncle attached and a fragment of the hæmal valve was recovered from some alcoholic miscellanea received from Dr. Cooper, as dredged by him in San Diego Bay, California. The fragments were returned by Mr. Cuming as *Lingula albida*, Hds., and it is not improbably that species.

The specimen differs from the figure in the Conchologia Iconica, in being more compressed at the sides, and in wanting the oblique transverse striations of the figure.

I am informed that Dr. W. Newcomb dredged a living specimen of this species off Santa Barbara Island, California, and that it is now, with the remainder of his fine collection, in the cabinet of Cornell University, New York.

This species differs from the typical species of *Lingulidæ*, in the diverging lamellæ which support the post-parietals, in the form of the anterior adductor scars, and in its color.

A microscopical examination of the shell gave the following results:

There were no punctures visible with a good light and a power of 900 diameters. The substance of the shell was shown by a cross section to be composed of translucent horny laminæ, nearly parallel with one another and separated by layers of white amorphous calcareous matter which looked much like powdered sugar. There were no tubuli visible after the most careful search; the horny layers presented faint indications of a partially fibrous structure, but nothing of the kind extended to the calcareous layers. A section of the lamina much resembled the end of a T-rail, with one flange taken off and obliquely inclined. The anterior part of the shell contained less calcareous matter than that nearer the beaks, and the margin seemed entirely horny. The number of horny layers amounted to eight or ten, in the thickest part of the shell. They were not uniform in thickness, but were thinner than the amorphous calcareous layers.

The paucity of material prevented a fuller examination, but it is to be hoped that some one will examine typical specimens of Hinds' species and report on their structure. The present species may be distinct and the *albida* a true *Lingula*, but this can only be decided by reference to the type.

If the two are identical, it seems strange that the remarkable internal structure should have remained so long unnoticed.

This genus appears to take the place in America of the genus *Lingula*, which has its home in the Australian and Indo-Pacific Seas.

GLOTTIDIA PYRAMIDATA, Stm.

*Lingula pyramidata*, Stm., Am. Journ. Sci. and Art, 1860, xxxix, p. 444.

This second species of *Glottidia* is generally of small size and horny texture. There is a very slight deposit of lime in the thickest part of the shell, but the greater portion is nearly or quite destitute of it, and contracts irregularly in drying. The laminæ and septum are entirely horny. The shell structure ap-

peared finely perforate under a power of 100 diameters. The septum and laminæ are about one-third as long as the shell.

This species has so far been found unattached. It is extremely active in its motions when disturbed, and has the power, as described by Mr. Morse, of burrowing in and travelling over the sand by contortions of the peduncle and movements of the setæ. Furthermore, the soft parts secrete a mucus to which grains of sand adhere, forming a "sandtube" of an extremely ephemeral nature, which sometimes extends over part of the valves; resembling in appearance, but not in texture or solidity, the tubes of some Sabellarian worms. For further details the reader is referred to the forthcoming memoir of Mr. Morse.

It is found on the south-eastern coasts of the United States, from Newberne to Port Royal.

?? Glottidia semen, Brod.

*Lingula semen*, Broderip, P. Z. S. 1833, p. 125.

*Habitat.*—Isle of La Plata, West Columbia.

It is possible that this and the following species also, from their outward resemblance to the two preceding, may belong to the present genus.

?? Glottidia antillarum, Rve., Conch. Icon. pl. ii, fig. 8, 1861.

*Hab.*—Martinique, Cuming.

?? Glottidia Audebarti, Brod., P. Z. S. 1833, p. 135. Rve., Conch. Icon. pl. i, fig. 5.

*Hab.*—Isle de Puna, Bay of Guayaquil; Cuming.

### Genus LINGULELLA, Salt.

*Lingulella*, Salt, Mem. Geol. Surv. of Great Britain, vol. iii, p. 333, 1866.

Shell resembling *Lingula*, with a produced neural beak, grooved for the passage of a very narrow pedicel. General form rounded triangular. Visceral area of the interior of the shell more or less strongly pitted.

*Type. Lingulella Davisii*, McCoy, An. and Mag. Nat. Hist. viii, p. 405. Dav., Sil. Brach. p. 55, pl. iv, fig. 1 to 16.

This is the oldest form of *Lingulidæ* known, according to Mr. Davidson. It is from the lower Silurian formation.

Genus TRIMERELLA, Bill.

*Trimerella*, Bill., June, 1862, Pal. Fos. Geol. Sur. of Canada, vol. i, p. 166.

Shell ovate, moderately convex, solid, and transversely striated. The inner surface of each valve furnished with a longitudinal septum, supporting a flat, horizontal, lozenge-shaped plate, attached by its posterior edges to the inner surface of the valves upon which the muscular apparatus was attached. On each side small ovate muscular scars, as in *Obolus*. Hæmal hinge line with faint longitudinal ridges.

*Type*. *Trimerella grandis*, Bill., Pal. Foss. Geol. Surv. Can. p. 166, fig. 151 a, b, 1862.

Fossil in the Silurian beds of Canada.

GOTLANDIA, Nom. gen. prov.

*Trimerella*, Lindström, Ofv. K. Vetenskaps Ak. För. 1867, p. 253, pl. xxi. Not *Trimerella*, Billings.

Shell subelongate, rounded before ; neural valve with an acute, produced apex ; hæmal shorter and more rounded, provided with a projecting, semi-oval, cardinal process, which is articulated into a half-moon-shaped pit just before the area in the neural valve ; hinge line of the latter very long and deeply grooved, the two grooves meeting at an acute angle on the posterior end of the valve. The hinge line of the hæmal valve is simple, fitting into the grooves just described, forming with the cardinal process an articulation of the two valves. Neural septum rounded at its anterior end, extending nearly to the margin ; on each side of the septum and closely attached to it is a tubular process extending as far back as the hinge margin, where the base forms the concave anterior wall of the cardinal pit. The top of the septum is lower than the concave surfaces of the tubes and forms the bottom of a gutter between them. The anterior ends of the tubes are nearly in the middle of the valves. Similar tubes exist in the hæmal valve, and the perforations are shown by a section to extend nearly to the apices. They are represented in casts by conical slender processes. The area behind the cardinal pit is covered with callus in the form of arched lamellæ. The muscular impressions have not been clearly made out, but appear to have been situated on the upper, posterior ends of the tubes.

*Loc.*—Silurian beds of the island of Götland.

This genus, as will be seen by the diagnoses, is quite distinct from *Trimerella*, Billings, though the latter has faint ridges on

the cardinal border, recalling to some extent the teeth of this form; though from the examination of the casts of *Trimerella* in the cabinet of Prof. James Hall, and gutta percha moulds prepared from them by Mr. Whitfield, it is evident that they have few characters in common with the one now under consideration. As Dr. Lindström did not give his species any name, and I am unable to find any other reference to it, I would propose the provisional name of *Gotlandia Lindströmi*.

This genus was unknown before the publication of Lindström's paper, and it proves to be extremely interesting. Here is a shell whose nearest affinities are with *Lingula* and *Obolus*, which, nevertheless, is as distinctly articulated as *Terebratula* itself! This raises the query as to the comparative value of the characters used by Gray, *i. e.*, the spiral or non spiral brachia, with those used by most naturalists in separating the Brachiopoda into orders. The muscular impressions would seem to have been remarkably posterior and the tubes may have been the seat of the ovaria.

### Genus LINGULEPIS, Hall.

*Lingulepis*, Hall, 16th Regents Rep. 1863, p. 129.

Shell linguloid, inequivalve, equilateral, oval-ovate or spatulate; in the neural valve the visceral area is tripartite, the lateral extensions the larger; in the hæmal valve the area is flabelliform. Shell corneous, phosphatic.

The scars of the anterior adductors appear to be in the sinuses on each side of the median prolongation of the visceral area in the neural valve. The posterior occlusers are very small, and placed within the visceral area much as in Lingula, except that they are close together, and located further back. The anterior occlusors median; before the mesial point of the area?

*Type*. *L. pinnæformis*, Hall, 16th Regent's Rep. pl. vi, fig. 15, 16. Owen, Geol. Minn. and Wisc. p. 582, pl. I. B. fig. 3, 4, 8.

Fossil in the Silurian formation.

This form is closely related to *Lingula;* the visceral area is slightly thickened, so that it leaves an indentation on internal casts. These have been referred to as muscular impressions.

## Section OBOLINÆ.

Post adductor scars more or less separated from the median line.

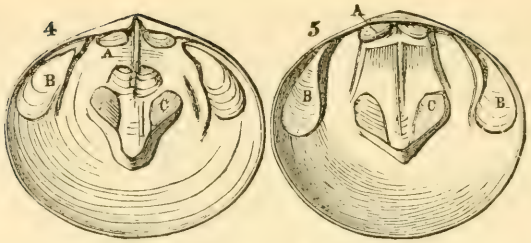



Fig. 38.

Fig 38. *Obolus Davidsoni*, Salter; after Davidson. 4, neural valve; the central scar is that of the pedicel muscles. 5, hæmal valve. A, post-adductors. B, sliding muscles. C, anterior adductors.

Genus OBOLUS, Eichw.

*Obolus*, Eichwald, Zool. Spic. vol. i, p. 274, 1829?
*Ungula*, Pander, Beiträge zur Geog. Russ. Reich. 1830.
*Ungulites*, Pander, Herman. ii, p. 132.
*Aulonotreta*, Kutorga, Ueb. die Siph. Verh. K. min. Ges. für 1847.

Shell subequivalve, orbicular, non-articulated valves united to each other by the muscles.

Neural valve most convex, with a short beak, flat hinge margin and false area, over which the lines of growth pass without interruption. The cardinal border is longitudinally grooved for the passage of a peduncle. Hæmal valve shorter than the other, slightly convex or quite flat, without a prominent apex. The hinge line passes, in a rounded arch, insensibly into the lateral margin; the cardinal border is flat, thickened and transversely striated, but not sulcated. Structure calcareo-corneous. External surface smooth or concentrically wrinkled. The neural valve is marked by a mesial ridge extending half its length; four small oval muscular scars are situated, one on each side, near the cardinal angles (*retractores posteriores*), the other two near the apex, on each side of the mesial ridge (*adductores posteriores*), and the scars of the anterior adductors are somewhat elongate, with their pointed terminations converging anteriorly in the middle of the valve.

*Type. Obolus apollinis*, Sch., Dav. Int. Br. Brach. p. 136, pl. ix, fig. 280—84.

Fossil in the Silurian beds of Russia.

Genus OBOLELLA, Billings. Pl. 6, fig. 7.

*Obolella*, Bill., Pal. Fos. Can. Geol. Surv. vol. i, 1861, p. 7.

Shell ovate or subquadrate, convex or compressed. Neural

valve with a more or less minute false area, usually grooved for the passage of the peduncle. Hæmal valve with or without an area. Lateral scars near the margin of the cardinal border; scars of anterior adductors differing from those of *Obolus* in diverging instead of converging anteriorly.

*Type.* *Obolella chromatica*, Bill., Pal. Fos. Can. Geol. Survey, vol. i, 1861, p. 7, fig. 7 a, b, c, d.

Subgenus KUTORGINA, Bill.

*Kutorgina*, Bill., Pal. Foss. Can. Geol. Survey, 1861, p. 69.

Hinge line straight, nearly as wide as the shell, sides nearly straight, meeting the cardinal border at an obtuse angle.

Neural valve with an area and foramen. A pair of subcentral, oval muscular impressions, but no vestiges of lateral scars. Externally radiately striate.

*Type.* *Obolella* (*Kutorgina*) *cingulata*, Bill., Pal. Foss. Can. Geol. Sur. p. 9, fig. 8, 9, 10.

This subgenus differs from the typical form by its straight hinge line and striations, as well as the absence of the lateral scars; it resembles an *Orthisina* externally.

Subgenus MONOBOLINA, Salt.

*Monobolina*, Salter, Mem. Geol. Surv. Great Britain, vol. iii, p. 334, 1865.

Shell resembling *Obolus;* broad; external surface radiately striated; muscular scars united closely along the central line.

*Type.* *Monobolina plumbea*, Salt., Siluria 2nd Ed. p. 50, Fos. 8, fig. 1, 1859. Dav., Sil. Brach. p. 61, pl. iv, fig. 20, 27.

Fossil in the Silurian formation of Gt. Brit.

The *Obolus? Salteri*, Dav., Sil. Brach. pl. iv, fig. 28, 29, appears to be more nearly related to the *Lingulas* with an internal mesial ridge than to any of the *Obolinæ*.

Genus SPONDYLOBUS, McCoy.

*Spondylobus*, McCoy, An. Nat. Hist. viii, 2, p. 407.

Suborbicular, slightly narrowed toward the short indistinct hinge-line; nearly equivalve, flattened. Hæmal valve with a slightly excentric apex, beneath which, on the interior, the substance of the valve is thickened into a wide undefined boss. Opposite valve slightly longer, from the apex being perfectly mar-

gined and somewhat produced; channelled by a narrow triangular groove, the anterior end of which is flanked within by two very prominent, thick, conical, shelly bosses; representing hinge teeth. Substance of the valve thick, testaceous, not glossy; minutely fibrous but not distinctly punctured under a lens of moderate power except by the end of the fibres (McCoy).

*Type.* *Spondylobus craniolaris*, McCoy, An. Nat. Hist. 1851, p. 408.

*Hab.* Cambro-Silurian, McCoy.

Note. In the 16th Regents Report (1863), Prof. Hall figures, under the name of *Obolella? polita*, a shell which he described as *Lingula? polita*, in the Ann. Rep. Geol. Wisconsin, p. 24, 1850. He compares it with *Spondylobus* and *Obolella*, and doubtfully refers it to the last named genus. Owen gives an unrecognizable figure of the same shell under the name of Obolus (Appolinus ?) in his Geol. Rep. of Wiscon., Iowa and Minn., pl. i, B, fig. 9, 11, 15, 20. Prof. Hall describes the muscular impressions as follows: "The interior of the ventral? (neural) valve has a broad, somewhat cordiform, subcentral duplicate muscular impression, with a raised margin. From the centre beneath the beak extends a low flatly rounded ridge, which reaches into and partially divides the muscular impression. On each side of this low ridge is a nearly flat, slightly elevated plate or thickening of the shell, which, extending forward, is continued in its outer limbs in a raised border nearly around the muscular impression; giving to the whole a broad spatulate form, leaving a space in front where the shell is marked by a few radiating or vascular impressions. On each side of the central elevated plate and at the anterior extremities of the cardinal line, are two smaller muscular impressions. There is a narrow groove beneath the apex of the valve and on each side an elongate thickened boss or pad." (That is to say the hinge line is broad, arched and thickened, with a mesial groove for the peduncle). "The dorsal? (hæmal) valve has a narrow central muscular impression, the limits of which extend in an acute point below the middle of the shell; on each side is a broader limited area, reaching two-thirds the length of the shell, and extending into the cavity beneath the beak. The whole presents an ovate, somewhat cordiform area. No marginal muscular impressions have been observed in this valve. Apex emarginate, with a prominent pad (i. e. the thickened hinge line) or tooth-like process on either side." Hab. Lowest fossiliferous beds of the Potzdam sandstone (Hall).

The above description is not as clear as might be desired and

needs revision. Assuming the relative identity of the valves, as Prof. Hall has indicated, the impressions are as follows:

In the neural valve the scars of the adjustor muscles are situated on each side between the outer edge of the visceral area and the extreme edge of the hinge line near its outer end. The visceral area is traversed by a broad mesial ridge projecting a little beyond the edge of the area and abruptly truncate. At the outer angles of this end of the ridge are the ovate (and somewhat anteriorly divaricate) scars of the anterior adjustors, before which is a broad space, probably the seat of the anterior retractors. The visceral area is anteriorly prolonged into two narrow arms which pass between the lateral and median scars and nearly encircle the latter. (See pl. 6, fig. 5, 6.)

In the other valve the lateral scars are not visible; the anterior adductors seem from the figure to divaricate posteriorly, being very narrow and divided in the middle by a pointed lobe of the visceral area, and bounded on the outer sides by two broad pointed lobes of the same.

The position of the apex removes the shell from *Spondylobus*. The groove or emargination of the hinge line of both valves, as well as the form and position of the muscular scars, would also seem to prevent it from being placed in *Obolella*. It would seem to belong to an undescribed genus, but, in the absence of specimens, I do not feel warranted in characterizing it from figures alone, especially as the figures of *Obolella*, given by Mr. Billings, are very poor.

Since the first part of this paper was in type I have been indebted for facilities for study and other favors to Prof. Agassiz, of the Museum of Comparative Zoölogy, at Cambridge; Mr. Hyatt, of the Boston Society of Natural History; Prof. James Hall, State Geologist, of New York, Mr. J. G. Anthony; Mr. R. P. Whitfield, of Albany; Mr. Geo. W. Tryon, Jr., of the Philadelphia Academy of Natural Sciences, and especially to Mr. E. S. Morse, of Salem. To the last named gentleman I am indebted for the privilege of examining his beautiful anatomical drawings of various brachiopods, some of them taken from life, and for specimens of *Glottidia pyramidata*. Among Mr. Morse's drawings were some of a singular Sipunculoid worm, which would appear, from them, to have an anterior termination to the intestine, thus forming a notable exception to the general rule among worms. While dissenting entirely from the conclusions at which he has arrived, from his study of the brachiopods, I must express my full appreciation of his kindness in thus opening his portfolio for my examination, and of the value of his researches into the embryology and anatomy of this interesting

group. It is to be hoped that in his forthcoming memoir upon the subject he will give us *his* definition of a mollusk and of a worm, in order that we may more clearly comprehend the motives which have led him to unite two-thirds of the *Molluscoidea* with the Annelids.

I would add that, after an examination of some three hundred specimens of *Terebratula cubensis*, Pourtales, and a critical comparison of them with a large series of *T. vitrea*, that I have been forced to the conclusion that the two species are distinct, though closely allied; while among the specimens dredged by the Coast Survey Expedition I found some which seemed to be unmistakably *T. vitrea*. The characters appeared to be about as follows:

| *T. vitrea.* | *T. cubensis.* |
|---|---|
| *Lateral margins* horizontally rectilinear. | *Lateral margins* flexuous. |
| *Hæmal valve* rounded ovate. | *Hæmal valve* quadrangulate. |
| *Loop* with its sinuosity indented before, with a sharp point behind. | *Loop* indented behind, with a rather broad, squarish prolongation in front. |
| *Hinge teeth* close together, slender. | *Hinge teeth* more widely separated, stout and thick. |
| *Deltidium* narrow, small. | *Deltidium* wider, longer. |
| *Shell* somewhat compressed. | *Shell* inflated. *Foramen* generally larger in proportion. |

I have been thus explicit, as several excellent foreign naturalists have expressed the opinion that the species are identical. I have not had an opportunity of making a comparison of *T. cubensis* and *T. uva*, Brod.

The remarks in this paper upon the species described by Dr. A. A. Gould may possess some additional significance from the fact that they are made from an examination of his original type specimens.

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REFERENCE TO PLATES.—PLATE 6.

Fig. 1. *Terebratella caurina*, Gld., normal; nat. size.

2. 3. " " " varieties; " "

4. " *suffusa*, Rve.; loop. nat. size.

5. "*Obolella*" *polita*, Hall. Interior of neural valve, somewhat reduced from Hall's figure.

6. Same; interior of hæmal valve.

7. *Obolella chromatica*, Bill., from Billings.
8. *Centronella*, Bill.; showing the loop.
9. Loop of *Magasella* (? var.) *lævis*, Dall.; twice nat. size.
10. Side view of same, enlarged.
11. Profile of apophyses of *? Magas patagonica*, Gld.; enlarged twice nat. size.
12. Interior of hæmal valve of the same enlarged one-half.
13. *Magasella* (? var.) *lævis*, Dall.; twice nat. size.

## Plate 7.

Fig. a. Interior of neural valve of *Waldheimia Raphaelis*, Dall., showing muscular impressions.

b. Interior of hæmal valve of do., nat. size.

c. Side view of *Waldheimia Raphaelis*, Dall.; nat. size.

d. Anterior view of do.

e. Profile of loop of do., with one of the crura and part of the left hæmal process removed, to show outline of septum.

f. Hæmal valve of *Laqueus californicus*, showing the loop; reduced to one-half nat. size.

g. Profile of loop of *Laqueus suffusus*, Dall; magnified three times, linear.

h. *Laqueus suffusus*, Dall., nat. size.

s. Interior of hæmal valve of do., magnified.

## Plate 8.

Fig. 1. *Glottidia albida*, Dall.; nat. size.

2. " " " interior of neural valve, nat. size.

3. a, section of do. near beak, magnified. b, c, section of lamellæ.

4. Section of lamella magnified 500 diameters, showing the dark horny layers and white calcareous layers.

5. Section of thickest part of valve, same power, showing the layers.

6. Section of external horny layer, magnified 900 diameters, showing fibrous structure.

7. *Epithyris elongatus*, Schl., after Davidson; from a broken specimen.
8. Cardinal process of *Wald. venosa.*
9. " " " *Laqueus californicus.*
10. Posterior view of cardinal process of *L. californicus.*
11. Ditto of *W. venosa.*
12. Side view of apophyses of *Meganteris archiaci*, after Suess.

12*a*. View of the cardinal border of the same.

13. Apophyses of *Ismenia sanguinea*, enlarged.
14. Apophyses of *Kingena lima*, after Davidson.

## REVIEW.

*Notes on Lingual Dentition of Mollusca.* By W. G. Binney and Thomas Bland, Am. Lyc. Nat. Hist. N. Y. Vol. IX, pp. 281—294. February, 1870.

BY WM. H. DALL.

It is now twenty-four years since the appearance of a paper by Dr. Lovèn, on the classification of the mollusca by their lingual dentition, marked an era in malacological science. Long before, in the days of Adanson, and even before that time, the teeth with which some of the commoner species are furnished, had been noticed by observing students, but no investigations of practical importance preceded those of Lovèn and Troschell. Since that time the progress of this branch of the science has been slow but sure; and the great advances made are only apparent by comparison. While the claims of some of the more enthusiastic of its early advocates have hardly been realized, yet the character of the dentition, to-day, is accepted by the best authorities as one of the most important and reliable aids to the proper classification of species and genera.

In the present paper, figures are given of *Succinea Nuttalliana*, Lea, *Bulimulus pallidior*, Sby., "*Helix*" *tumida*, Pfr., *Zonites lævigata*, Pfr., *Veronicella floridana*, Bin., *Limax flavus*, Lin., *Melampus bidentatus*, Say, *Helicina occulta*, Say, *Pompholyx effusa*, Lea, *Planorbis trivolvis*, Say, and *Tulotoma magnifica*, Conrad.

The method of obtaining these figures, as stated by Mr. Binney before the Boston Society of Natural History a few months ago (Oct. 1869) was as follows: A microphotograph was taken, from the ribbon itself, upon a glass slide. This negative was then placed in a magic lantern and the magnified image thrown upon a sheet of white paper suspended on the wall, and the outlines then traced with pencil upon this paper. These outlines were then photographed upon the block, to be engraved. The sun, as Mr. Binney remarked, thus doing all the work, it was reasonable to suppose that the results would defy criticism.

The photography was done by Mr. Powel, and the tracing by Mr. Binney, in person; Mr. Bland, as we believe, not being responsible for any of this work, and consequently not responsible for the character of the figures. We believe that Mr. Binney has been conscientious in his work, and that the errors which we

are obliged to draw attention to are the result of a faulty method of working and inexperience in handling the delicate and complex structures which he has attempted to figure, rather than any want of care on his part.

Fig. 1, *S. Nuttallii*, and fig. 2, *B. pallidior*, are probably correct, though "d," in the first named figure, is exceedingly obscure, and we cannot believe that it is a satisfactory view of the 8th lateral, which it claims to represent. Fig. 3 is supposed to represent some of the teeth of *Cysticopsis tumida*. It is somewhat obscure, so that its true relations cannot be determined from the figure. This is a very interesting species, and it is a pity that a clear and comprehensible figure of its dentition was not given. Figs. 4, 5 and 6 were drawn by Dr. Leidy, and, though engraved in a manner which is not adapted to give a good idea of the teeth, especially the bases, yet they are probably pretty correct, while it must be remembered that they were drawn twenty years ago. The central tooth of fig. 6 (*Limax flavus*), does not agree with Morse's figure to which Mr. Binney refers. The latter is most probably the more correct of the two, if they were both obtained from the same species, which would seem doubtful. The figure of *Melampus bidentatus*, Say, bears intrinsic evidence of general correctness, though poorly drawn and possibly not exact in detail. The figure (No. 8) of *Helicina occulta*, Say, is very bad and quite erroneous. We have examined some of the specimens collected by Mr. Leland, from among which Mr. Binney obtained the radula here figured, and which were labelled by the latter gentleman as *Helicina occulta*. The central tooth is quite destitute of denticles, is of a different shape from that given in fig. 8, and the lateral teeth differ in many particulars. The uncini have not the hoe-like form of those in the figure.

On the whole, the radula strongly resembles Troschel's figure of the dentition of *H. orbiculata*, Binn., (*H. trossica*, Troschel,) but the central tooth is proportionally larger and the laterals differ in minute details. No true *Helicina* yet examined, has a denticulate median tooth, and this should have put Mr. Binney on his guard. The only conjecture we can offer as to the cause of the error is that it might have been a broken and worn anterior tooth, or the false appearance of denticles might have been caused by the refraction of too strong a light used during the examination. The radula has been examined by several competent naturalists, and there can be no doubt as to the edentulous character of the median tooth.

Fig. 9 (*Pompholyx effusa*) is also exceedingly erroneous. We are indebted to the extreme courtesy of Mr. Binney for a fresh specimen of the typical *effusa*, and for the opportunity of

examining his original microscopic slides and the photograph taken from them. No such teeth as are indicated for the first five laterals in this figure, are to be found on the original radula. The central tooth is almost certainly bidentate instead of simple. The specimens referred to, now in the Mus. Comp. Zoology, were unfortunately mounted in Canada balsam, which, by rendering the teeth quite transparent, ruins them as objects of reference. Still, enough was made out to render the above statements positive, and they were still further confirmed by the radula of the fresh specimen, although the latter was somewhat immature. If further doubt existed as to the erroneous nature of the figure a careful examination of the photograph, taken from the original radula before it was spoiled by the balsam, would satisfy the most incredulous. An examination of twenty-five radulæ of a closely allied species of the same genus, disclosed the fact that the outer laterals of *effusa* are furnished with one or two more denticles, while the inner laterals appear nearly identical. The error was almost certainly caused by mistaking and confusing the outlines of the bases as seen through the translucent cusps, with the outlines of the cusps themselves.

We have not at hand a specimen of *Planorbis trivolvis* to compare with fig. 10. Any of our readers who possess a first class microscope will be able to make the necessary comparisons during the coming season. The teeth of *P. lentus*, as we have examined them, differ considerably from those of *P. trivolvis* as here figured. The cusp of the rhachidian tooth appears to us to be bifid, rather than furnished with two spike shaped denticles. The teeth of *Tulotoma magnifica*, long a desideratum, are so simple that it would be difficult to fall into serious error in figuring them. It may, however, well be doubted if the denticulations are so ragged and irregular as here figured, and indeed it would be satisfactory to have any of the figures in this paper confirmed by more careful drawings.

In conclusion, we would remark, that any practical microscopist will feel the utter inadequacy of the process previously described, for furnishing reliable figures of anything, unless checked and controlled by a trained eye, experience with the microscope and with the special department under consideration. That photography can greatly assist there is no doubt, but as a sole reliance it is untrustworthy.

We feel sure that the gentlemen whose names head this review will regret as much as we do that their wide and well deserved reputation should give weight and authority to such errors, and that they will consider this review to be, as it is, wholly prompted by the interests of Science, and totally free from any personal considerations.

## RECTIFICATION OF THE SYNONYMY OF CERTAIN SPECIES OF MARGINELLA.

BY JOHN H. REDFIELD.

In Vol. V. of this Journal, p. 91, I referred to a species of *Marginella* figured by Reeve for *M. maculosa*, Kiener, but which I regarded as distinct from Kiener's species, though I was not then prepared to name it, for want of an acquaintance with the shell itself. Among some shells recently sent me for inspection by Governor Rawson of Barbadoes, was a *Marginella* from the Grenadines, which I at once recognized as the shell figured by Reeve as *M. maculosa*, Kiener, and by Sowerby as *M. guttata*, Swains., but which I am convinced should not be confounded with either. For this species I now propose the name of *Marginella calculus*. In the paper above quoted, I have already attempted to correct the perplexed synonymy of some allied species, but I am now enabled more satisfactorily to elucidate the four species to which the name of *guttata* has been by turns applied—a name which must be retained for only the first of those which follow:

1. M. GUTTATA, Dillwyn, Descript. Catal. p. 526, 1817.

*M. longivaricosa*, Lam., Kiener, Sowb. in Thesaurus.

*Hab.* Caribbean Province, Honduras to Tortola.

This well known species was first pointed out by Sloane in his history of Jamaica.

2. M. PHRYGIA, Sowb.

*M. guttata*, Swains., Zool. Illust. 2d ser. i, pl. 44, f. 3, 1829.
*M. phrygia*, Sowb., Thes. Conch. i, 394, pl. 78, f. 218, 219, 1846.
*M. Swainsoniana*, Petit, Cat. in Journ. de Conch. ii, 55, 1851.
*M. phrygia*, Reeve, Conch. Icon. pl. 15, f. 67, 1865.

*Hab.* Gulf of California, Reeve. I have received it from Acapulco, collected by Sloat. Swainson and Sowerby were unacquainted with its habitat. Not common in collections.

3. M. MACULOSA, Kiener, Coq. Viv. Marg. p. 26, pl. 9, f. 40, 1834.

*M. muralis*, Hinds, Proc. Lond. Zool. Soc. 1844, p. 76. Sowb. Thes. Conch. i, 394, pl. 78, f. 217, 1846. Reeve, Conch. Icon. pl. 15, f. 69, 1865.

*Hab.* Caribbean Province; Bahamas to Curaçoa. Frequently found among the small shells brought from the Bahamas. It is hardly *diaphanous*, as Kiener calls it, but much nearer to it than is the following species.

4. M. CALCULUS, Redfield.

*M. guttata*, Sowb., (not Swains.) *Syn. excl.* Thes. Conch. i, 394, pl. 78, f. 208, 209, 210, 1846.

*M. maculosa*, Reeve, (not Kien.) *Syn. excl.* Conch. Icon. pl. 15, f. 65, a, b, 1865.

Shell oval, solid, polished, yellowish white, transversely tessellated with milk white spots and yellow guttules which deepen in color towards the left. Spire concealed. Lip not reflected, finely toothed or striated on inner margin. Columella shows from six to eight plaits, of which the upper ones are almost obsolete, while the lowest but one, is broad and stout.

Length, 11 millemetres. Breadth, 8 millemetres.

*Hab.* St. Vincents, Sowb., Reeve; Grenadines, Rawson.

This species is remarbable for its solidity, and approaches in type the group to which belong *M. interrupte-lineata*, *M. obesa* and *M. tessellata*. It differs from *M. maculosa*, in its less elongated form and greater solidity and in the oval rather than square form of its guttules, which are not so plainly grouped into darker bands as in *M. maculosa*. Sowerby's figure above quoted well represents the species.

From *M. phrygia* it is distinguished by its greater size and solidity and by its markings, which in *M. phrygia* assume the character of dark brown rings more or less complete, as is well shown in Swainson's magnified figure. Swainson's shell was only 8 millemetres in length; my own specimens of *M. phrygia* measure but 7. Full grown specimens of *M. maculosa* measure 12 millemetres in length and 6 in breadth. Perfect and mature shells of both *M. maculosa* and *M. calculus* show the lip to be striate or denticulate within, a feature noticed by Hinds, but overlooked by Kiener and Reeve.

The key to the confusion which has existed in regard to these species is found in the early erroneous assumption that Kiener's species was identical with Swainson's. This being corrected, the synonymy readily resolves into truth.

# NOTICES AND REVIEWS

OF

# NEW CONCHOLOGICAL WORKS.

BY GEO. W. TRYON, JR.

## I.—AMERICAN.

**Report on the Invertebrata of Massachusetts.** Published agreeably to an order of the Legislature. Second Edition, comprising the Mollusca. By AUGUSTUS A. GOULD, M.D. Edited by W. G. BINNEY. 8vo., 524 pp., with twenty-seven chromolithographic plates and over seven hundred wood engravings. Boston, 1870.

The first edition of this Report was published in 1841, and included the Crustacea, Annelida and Radiata. The work became scarce many years ago, being highly prized by all persons engaged in conchological pursuits as the only reliable book published containing descriptions of the marine mollusca of the Atlantic Coast of the United States. The Legislature of Massachusetts, continuing the wise liberality which has always characterized the educational system of that very enlightened commonwealth, in 1865, authorized Dr. Gould to prepare a new edition of his work for publication at the expense of the State. Unfortunately for Conchological Science, Dr. Gould died in 1866, leaving his work in an advanced but incomplete stage. In 1867 Mr. W. G. Binney was appointed by the Governor and Council of Massachusetts to complete the work, "as nearly as possible in accordance with the views and wishes of the author." The selection of Mr. Binney was a happy one, as perhaps no one else could have carried out the above instructions so faithfully. Dr. Gould was the literary executor of Dr. Amos Binney, and edited and published that distinguished Conchologist's magnificent Monograph of the Terrestrial Mollusca of the United States. Mr. W. G. Binney's relations with Dr. Gould were thus most intimate, originat-

ing in the above valuable scientific service rendered by the latter, and now the son has the satisfaction of repaying the obligation in kind. Of course, under the restrictions imposed upon Mr. Binney by the Governor of Massachusetts, we are not to expect "all the improvements in classification, &c., which more recent investigations have suggested," and, accepting this necessary limitation, Mr. Binney may be congratulated upon having performed his work generally in a very creditable manner. In all that relates to the marine and terrestrial species it is, in *every* respect, the most valuable as well as the most elegant volume on conchology ever issued in the United States. The plate illustrations in chromo are beautifully executed by Messrs. Bowen and Company, of Philadelphia, and carefully finished by hand, and the very fine wood-cuts printed in the text were drawn by Mr. E. S. Morse and engraved by Mr. Henry Marsh, both justly celebrated for their natural history illustrations.

We do not believe that, were Dr. Gould living, he would approve the views of Mr. Binney concerning the fluviatile mollusca. These views we have already criticised at length upon several occasions, and will not now recur to them.

A very few copies of this elegant book, printed on tinted paper and finely bound, are for sale by Little and Brown, of Boston, at the very low price of Fifteen Dollars—and will doubtless find quick sale. Early application should be made for them, as they will surely become as scarce as the first edition in a short time.

The following new species are described:*

*Boltenia Burkhardti*, Agassiz.
*Lyrodus*, nov. gen. (*Téredidæ*).
*Lyrodus chlorotica*, Gould.
*Doris tenella*, Agassiz.
*Doris diademata*, Agassiz.
*Doris grisea*, Stimpson.
*Æolis pilata*, Gould.
*Calliopæa fuscata*, Gould.
*Embletonia fuscata*, Gould.
*Embletonia remigata*, Gould.
*Hermæa cruciata*, Alex. Agassiz.
*Elysia chlorotica*, Agassiz.
*Placobranchus catulus*, Agassiz.

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**Annals of the Lyceum of Natural History.** New York. IX. No. 10. April, 1870.

*On the genus Pompholyx and its allies, with a revision of the Limnæidæ of authors.* By Wm. H. Dall.

A variety of *P. Leana*, Adams, or possibly a new species, from Clear Lake, California, is described under the name of *solida*. Mr. Dall corrects an error in his description of the

*Mr. A. E. Verrill, in the American Journal of Science and Arts, May, 1870, states that many of the so-called new Ascidians are not entitled to specific rank, being synonyms merely.

animal of *Pompholyx*, published in the Proc. Cal. Acad., 1866. He there asserted that it possessed two pairs of eyes, founded upon drawings and descriptions furnished to him by Mr. W. M. Gabb. There are no tentacular eyes, however, but the tentacular nerve is marked by a central line of pigment cells, which, in some specimens, is crowded near the tips, forming black spots, which were mistaken by Mr. Gabb for eyes. The soft parts of *Pompholyx*, together with the dentition, are fully described in this paper, as well as the soft parts of other genera of Limnæidæ.

The author follows Binney in including "*Strebelia Berendtii*" (*Physella*) in the Limnæidæ, although it is undoubtedly a land shell, as the description and figure will satisfy any one who will study them. Very likely the name "*Physella*" has suggested placing this species among the fluviatiles.

*Carinifex Tryoni*, Meek, is made a new subgenus—*Vorticifex*. It is a fossil from the Nevada tertiary. *Physa costata*, Newcomb, is made the type of a new subgenus—*Costatella*. "Shell rounded, with transverse undulations or costæ."

*Paludina* or *Physa scalaris*, Jay, is referred, very correctly we think, to the subgenus *Ameria*, Adams.

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**Annals of the Lyceum of Natural History**. New York. IX. No. 9. March, 1870.

*Notes on the Lingual Dentition of Mollusca*. By W. G. Binney and Thomas Bland.

The species figured and remarked upon are *Succinea Nuttalliana*, *Bulimulus pallidior*, *Helix tumida*, *Zonites lævigata*, *Veronicella Floridana*, *Limax flavus*, *Melampus bidentatus*, *Helicina occulta*, *Pomphlyx effusa*, *Planorbis trivolvis*, *Tulotoma magnifica*.

To this paper is added an important note by Mr. W. G. Binney on *Viripara lineata*, Val. The author confirms the suspicions of conchologists regarding the locality of this species. When in Paris, in 1867, he examined the original specimen, and found it labelled "Lake Erie," and then in Valenciennes' hand-writing was added, "this is a mistake, the shell comes from India." Thus the question of locality is settled, and the specimen is the well known *Paludina Bengalensis*. Valenciennes' name becomes a synonym, as *Bengalensis* has priority, but Mr. Binney seems still to overlook the fact that the description and figure of Küster apply unmistakably to our American species, and he was not justified in giving a name (*V. contectoides*) to it, as *V. lineata*, Küster, *not* (Valenciennes) must stand. Mr. Binney very justly condemns American writers for their carelessness, and distinctly

refers to me (Proc. Acad., Phila., p. 451, 1862.) I acknowledge the justice of his stricture in this instance, and regret that Mr. Binney has not escaped giving like cause for censure in dealing with the same species.

*Notes on Species of the Family Corbiculadæ.* By TEMPLE PRIME.

*C. ammiralis*, nov. sp. Cambodia. *C. baronialis*, Australia.
*C. gubernatoria*, " " *C. consularis*, Malacca.
*C. Delessertiana*, " Smyrna. *C. episcopalis*, Cambodia.
*C. imperialis*, " Pondicherry. *Cyrena tribunalis*, Ecuador.
*C. Amazonica*, Anthony, nov. sp. Riv. Amazon.

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**Proceedings Boston Society of Natural History.** December, 1869.

*The Molluscan Fauna of New Haven.* Part II. *Acephala* and *Bryozoa.* By GEORGE H. PERKINS.

The author follows the very reprehensible practice of quoting in most cases (though not always) the name of the systematist who has made the latest generic change instead of the original describer of the species.

Mr. Conrad did not change *Cytherea convexa*, Say, to *C. Sayii*, because *convexa* is preoccupied, as stated by Mr. Perkins, but because the recent species is different from the fossil form called *convexa* by Say.

In accordance with a recent "rule" of the British Association, *Mercenaria violacea* is changed to *Crassivenus mercenaria*, and *Totteniana* (should be *Tottenia*) *gemma* is substituted for *Gemma Totteni*. But the "rule" will, in this as in other cases, doubtless prove the *exception*. Neither the original specific nor generic name can be altered; justice requires that *Mercenaria mercenaria*, and *Gemma gemma* shall stand, however inelegant, and we can do nothing to prevent even the recurrence of such inelegancies except to point them out as infelicitous names, and recommend that they be avoided in the future.

*Astarte lutea*, Perkins, nov. sp.

In conclusion, the author gives a list of species reported from Long Island Sound but not yet found in New Haven Bay.

A continuation of Mr. Perkins' paper contains a list of marine and fresh water Polyzoa of New Haven, and a catalogue of species heretofore reported from Long Island Sound, but not detected in New Haven Bay.

*Remarks on Distribution of Marine Animals.* By WM. H. DALL.

"Mr. Wm. H. Dall made a few remarks upon the distribution of marine animals, asserting that their range was influenced more by the temperature of the water than by the depth or other conditions. He showed that the floating ice line of Behring Sea (which passes between the Pribyloff and St. Matthew groups of islands, touching the continent near Kuskoquim Bay) governed the distribution of the fish and mollusks of those waters. It is the northern limit of all the more southern forms, some of which range as far south as Monterey. It is the southern limit of almost all the truly arctic species. The fur seal is never found to the north of it, though often erroneously spoken of as coming from Behring Strait; the polar bear never passes to the south of this line; the cod invariably keep to the south and the mullet to the north of it. It is also the limit of distribution of many fuci and seaside plants.

"Where the water is cooled by northern currents or by glaciers, deep water species of mollusks, especially Brachiopods, are found at or even above low-water mark. Where the surface is warm, these mollusks, which in the north are found near the shore, are only obtained at a depth of many fathoms."

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**American Journal of Science and Arts.** Vol. 49. No. 146. March 1870.

*Contributions to Zoology from the Museum of Yale College.* No. 6.—*Descriptions of Shells from the Gulf of California.* By A. E. VERRILL.

| | |
|---|---|
| *Semele Junonia*, | *Loripes edentuloides*, |
| *Tivela elegans*, | *Xenophora robusta*, |
| *Venus isocardia*, | *Enœta Pedersenii*, |
| *Chione tumens*, | *Lyria* (*Enœta*) *Cumingii*. |

*Semele venusta*, A. Ad., is supposed to be the young of *S. formosa*, Sowb.

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## II.—FOREIGN.

### FRENCH.

**Journal de Conchyliologie.** 3d Ser., X., No. 2. 128 pp. 8vo., and five plates. Paris. April, 1870.

*Sur la Faune Conchyliologique marine des baies de Suez et de l'Akabah.* By P. FISCHER.

This paper contains a catalogue of species and the description of the following, new to science:

| | |
|---|---|
| *Murex Erythræus*, | *Mytilus Pharaonis*. |

*Faune malacologique terrestre et fluviatile des Iles Viti, d'après les envois de M. le Dr. Edouard Græffe.* By ALBERT MOUSSON.

This is the fourth memoir on the above subject by Prof. Mousson. The following are the new species and varieties:

*Cyclophorus* (*Ostodes*) *diatretus*, Gould, var. *intercostata*, Mousson.

*Diplommatina Pomatiæformis*,
" *subregularis*,
" *Godeffroyana*,
" *ascendens*,
" *tuberosa*,
" *Martensi*, H. Ad.
" var. *macrostoma*,
" *quadrata*,
" *fuscula*,
*Realia ingens*,
" *costulata*,
" *circumlineata*,
" *subsoluta*,
" *longula*,
" *bifilaris*, Mousson.
var. *angustata*,
*Hydrocena brevissima*,
*Truncatella turricula*,
" *funiculus*,
*Helicina fulgora*, Gld.
var. *expansa*,
" *tectiformis*,
" *interna*,
" *Semperi*,
" *musiva*, Gld.
var. *Vitiana*,
var. *subcarinata*,
*Melania plicatilis*,
" *plutonis*, Hinds.
var. *callosa*,
*Melania Samoensis*, Reeve.
var. *exposita*,
" *Ovalana*, Mousson.
" *M. perpinguis*, Gld,
" non Hinds.
var. *plicato costata*,
var. *Kanathiana*,
" *subexusta*,
var. *persulcata*,
var. *albizonata*,
" *Assavaensis*, Mousson.
" var. *desulcata*,
" *Terpsichore*, Gld.
var. *Mangoensis*,
" *turritelloides*,
" *tetrica*, Gld.
var. *tumida*, Mousson.
*Neritina Pritchardi*, Dohrn.
var *Vitiana*,
" *cornuta*, Reeve.
var. *Pacifica*,
" *frondosa*,
" *olivacea*, Le Guillou.
var. *Vitiana*,
" *Garretti*,
" *deltoidea*, Garrett, MS.
*Navicella Schmeltziana*.
" *Freycineti*, Recluz.
var. *Vitiensis*,

*Diagnosis Mollusci novi, reipublicæ Mexicanæ incolæ.* By H. CROSSE and P. FISCHER.

*Zonites Tuxtlensis.*

*Description d'un Athoracophorus inédit provenant de la Nouvelle Calédonie.* By H. CROSSE and P. FISCHER.

*Athoracophorus modestus.*

*Diagnoses Molluscorum Novæ Caledoniæ incolarum.* By H. Crosse.

*Helix Vincentina*,
" *multisulcata*,
" *subsidialis*,
" *Ferrieziana*,
" *Ostiolum*,
" *Noumeensis*,
" *minutula*,
" *fibratus*, Martyn, vars.
" *Souvillei*, Morelet, var.
" *Alexander*, var.
" *pseudocaledonicus*, Montr., var.
*Bulimus Mageni*, var.
*Tornatellina Noumeensis*,
*Helicina Mariei*,
" *porphyrostoma*,
" *læta*,
" *Mouensis*,
" *benigna*,
" *littoralis*, Montr. var.
*Turbinella Noumeensis*,

*Diagnoses Molluscorum novorum.* By H. Crosse.

*Helix metula*, Solomon's Archip.
" *Biocheana*, " "
*Bulimus Kantavuensis*, Vitian Archip.
*Registoma Brazieri*, New Hebrides.

*Variétés. Ne sutor ultra crepidam!* By H. Crosse.

This paper administers a well-deserved castigation to the English monographists, Reeve and Sowerby, for their carelessness in identifying and describing species in the Conchologia Iconica, etc.

*Bibliographie.*

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**Revue et Magasin de Zoologie.** No. 1. 1870.

*Mollusques nouveaux, litigieux ou peu connus.* By M. J. R. Bourguignat.

*Daudebardia nubigena*, Mt. Atlas of Blidah.
" *Atlantica*, Algiers.
*Zonites septentrionalis*, North ofFrance.
" *Farinesianus*, Oriental Pyrenees, etc.
" *Navarricus*, Spain.
*Helix Schlærotricha*, Kabylia.
" *Simoniana*, Toulouse.
" *Martorelli*, Barcelona.
" *Tenietensis*, Algiers.
*Planorbis Mabilli*, France.

# CATALOGUE

## OF THE KNOWN SPECIES, RECENT AND FOSSIL,

OF THE

# FAMILY MARGINELLIDÆ.

BY JOHN H. REDFIELD.

The *Marginellidæ* form a distinct and well marked group, and may be regarded as a subdivision of the larger group of *Volutaceæ*, and intermediate between *Volutidæ* and *Cypræidæ*. As now restricted, the family contains only the genera *Erato*, *Marginella* and the fossil genus *Volvaria*, including in *Marginella* many subgenera proposed by authors. The genus *Ringicula*, of Deshayes, which some have placed next to *Marginella*, is now better referred to the family *Tornatellidæ*, near *Cinulia*, of Gray. The genus *Pachybathron*, of Gaskoin, represented by two little known species, and by him placed in the family *Marginellidæ*, is probably more nearly related to *Oniscia*, and by Chenu has been with good judgment referred to the family *Cassididæ*.

## Family **MARGINELLIDÆ**, Redf.

*Les Columellaires*, (in part) Lamarck, Phil. Zool. 1809.
*Marginelladæ*, (in part) Fleming, British Anim. p. 328, 1828.
*Marginellinæ*, Swainson, Treatise on Malacology, p. 98, 1840.
*Columellata*, (in part) Reeve, Elements of Conch, p. 44, 1849.
*Marginellidæ*, (in part) Redf., Catalogue of Collect. of Marg., 1851. P. P. Carpenter, Cat. of Mazatlan Mollusca, 1857. H. and A. Ad., Genera of Recent Moll. I, 1858.
*Volutidæ*, (in part) Woodward, Manual of Mollusca, p. 118, 1851. (In part) Chenu, Man. de Conchyl. I, 184, 1859.

## Genus **ERATO**, Risso.

Hist. Nat. de Nice iv, 240, 1826.

### A. *Recent Species.*

**1. E. angistoma,** Sowb., Conch. Illust. f. 51, 1841.
Reeve, Conch. Iconica, Erato, pl. 3, f. 13, 1865.
*East Indies*, Reeve.

**2. E. angulifera,** (Sowb. ined.) Reeve, Conch. Icon. Erato, pl. 2, f. 6 a, b, 1865. *Borneo.*

**3. E. callosa,** Ad. and Reeve, Voyage of Samarang, Moll. p. 25, pl. 10, f. 32, a, b, 1850.
Reeve, Conch. Iconica, Erato, pl. 1, f. 2, a, b, 1865.
*China Sea.*

**4. E. columbella,** Menke, Zeitschrift für Malak, 1847, p. 183, 1847.
*Erato leucophæa*, Gould, Boston Journ. Nat. Hist. vi, 386, pl. 14, f. 20, 1853.
*Erato columbella*, Carpenter, Proc. Lond. Zool. Soc. 1856, p. 206, 1856.
*Erato leucophæa*, Gould, Otia Conchologica, p 187, 1862.
*Erato columbella*, Reeve, Conch. Icon. Erato, pl. 1, f. 1 a, b, 1865.
*W. coast of America from Santa Barbara southward to Mazatlan.*

**5. E. corrugata,** Hinds, (ined.) Reeve, Conch. Icon. Erato, pl. 3, f. 12, 1865. *I. Mindoro, Philippines.*

**6. E. cypræoides,** C. B. Ad., Proc. Bost. Soc. Nat. Hist. ii, 1, 1845. *Jamaica.*

E. CYPRÆOLA, Risso, is *Erato lævis* (*Don.*)
E. CYPRÆOLA, (Sowb.) (Marginella) is *Erato scabriuscula*, Gray.
E. DONOVANI, (Payr.) (Marginella) is *Erato lævis*, (Don.)
E. FUSIFORMIS, Turton, (Voluta) is " " "

**7. E. gallinacea,** Hinds, (ined.) Reeve, Conch. Icon. Erato, pl. 2, f. 7 a, b, 1865. *I. Mindoro, Philippines.*

E. GRANUM, Kiener, (Marginella) is *Erato scabriuscula*, Gray.
E. GUILFORDIA, Risso, (Columbella) is *Erato lævis*, (Don.)

**8. E. guttula,** Sowb., Conch. Illustrations, f. 50, 1841.
*Habitat unknown.*

E. HEMATINA, Reeve, is *Marginella hematita*, Kiener.

**9. E. lachryma,** Gray, Descriptive Catalogue, p. 17, 1832. Sowb., Conch. Illust. f. 48, 1841. Reeve, Conch. Illust. Erato, pl. 2, f. 9 a, b, 1865.

*New Holland*, Gray; *Japan*, Reeve.

**10. E. lævis,** (Donovan.)

*Voluta lævis*, Donovan, Brit. Shells v, pl. 165, 1803.

*Cypræa voluta*, Montagu, Test. Brit. 203, pl. 6, f. 7, 1803.

*Voluta lævis*, Mat. and Rack., Lin Trans. viii, 133, 1807.

*Voluta cyprœola*, Brocchi, Conch. Foss. Subap. ii, 321, pl. 4, f. 10 a, b, 1814.

*Voluta lævis*, Dillwyn, Descr. Catalogue, p. 527, 1817. Wood, Index Test. pl. 19, f. 61, 1818. Turton, Conch. Dict. Brit. Isl. p. 252, 1819.

*Voluta fusiformis*, Turton, Conch. Dict. Brit. Isl. p. 251, 1819.

*Columbella Guilfordia*, Risso, Hist. Nat. de l'Europe Merid. p. 205, pl. 7, f. 87, 1826.

*Erato cyprœola*, Risso, Hist. Nat. de l'Europe Merid. p. 240, pl. 7, f. 85, 1826.

*Marginella voluta*, Fleming, Brit. Anim. p. 335, 1828.

*Marginella muscaria*, (not Lam.) Costa, Cat. Test. Sic. p. 73, 1829.

*Erato cyprœola*, Costa, Anim. di Nap. pl. 82, f. 5, 6, 1830.

*Marginella cyprœola*, Grateloup, Actes de la Soc. Lin. Bord. vi, p. 300. f. 33, 34, 1833.

*Marginella Donovani*, Kiener, Coq. Viv. Marginella, p. 16, pl. 8, f. 34, 1834.

*Erato cyprœola*, Philippi, Enum. Moll. Sic. i, 233, 1836.

*Erato lævis*, Sowb., Conch. Illustrations, p. 15. f. 57, 1841. Reeve, Conch. Syst. pl. 285, f. 3, 1843.

*Erato cyprœola*, Philippi, Enum. Moll. Sic. ii, 197, 1844.

*Marginella Donovani*, Thorpe, Brit. Marine Conch. p. 220, 1844.

*Marginella lævis*, Desh., ed. of Lamarck, x, 452, 1844.

*Marginella Donovani*, Chenu, Bibliothéque Conch. 1st series, i, 108, pl. 45, f. 5, 6, 7, 8, 1845.

*Erato lævis*, Reeve, Elements of Conch. pl. 1, f. 3, 1846. S. V. Wood, Crag Mollusca, p. 18, pl. ii, f. 10 a, b, 1848. Deshayes, Traité Elementaire de Conch. pl. 123, f. 14, 1850.

*Marginella lævis*, Forbes and Hanl., Brit. Moll. iii, 502, pl. 114 B, f. 4, 5, and animal, pl. NN, f. 8, 9, 1853. Clark, Brit. Mar. Test. Moll. p. 506, 1855.

*Erato lævis*, H. and A. Ad., Gen. Rec. Moll. i, 189, pl. 20, f. 1 (animal f. 1, b), 1858. ? Emmons, Geol. Survey N.

Car. 1858, p. 262, f. 139, 1858. Chenu, Man. de Conch. i, 200, f. 1068, 1859.

*Erato cyprœola*, Chenu, Man. de Conch. i, 200, f. 1069, 1859.

*Erato lævis*, Sowb., Ill'd Index Brit. Shells, pl. 19, f. 27, 1859. Reeve, Conch. Icon. Erato, pl. 1, f. 5 a, b, 1865.

*Marginella lævis*, Jeffreys, Brit. Conch. iv, 400, pl. 7, f. 3, 1867.

*Erato lævis*, Weinkauff, Conch. des Mittelmeeres, ii, 18, 1868.

*Coasts of England, Atlantic coasts of France and Spain and Mediterranean Sea. Also fossil in pliocene and miocene of England, France, Italy, Greece, and perhaps of North Carolina.*

E. LEUCOPHÆA, Gould, is *Erato columbella*, Menke.

**11. E. marginata,** Mörch, Malak. Blätt. vii, 85, 1860.

*E. Maugeriæ*, var. *Panamensis*, P. P. Carpenter, Proc. Zool. Soc. 1856, p. 162, 1856.

*Central America, at Panama and Bocoropes.*

**12. E. Maugeriæ,** Gray, Desc. Catalogue, p. 17, 1832.

Sowb., Conch. Manual, f. 454, 1839. Sowb., Cat. Cypr. p. 15, No. 4, 1841. Sowb., Conch. Illustr. f. 47, 1841. Reeve, Conch. Systematica, ii, 260, pl. 285, f. 4, 1842. S. V. Wood, Crag Mollusca, p. 19, pl. ii, f. 11 a, b, 1848. Reeve, Conch. Iconica, Erato, pl. 2, f. 10 a, b, 1865.

*Caribbean Sea, Guadaloupe to Jamaica. Also fossil in pliocene and miocene tertiary of England.*

**13. E. minuta,** Reeve, Conch. Icon. Erato, pl. 3, f. 11, 1865.

*I. Ticao, Philippines.*

E. MUSCARIA, Costa (Marginella) not Lam. is *Erato lævis* (Don.)

**14. E. nana,** Duclos (ined.), Reeve, Conch. Icon. Erato, pl. 3, f. 18, 1865.

*I. Bourbon*, Desh.; *New Caledonia*, Fischer.

**15. E. pellucida,** Reeve, Conch. Icon. Erato, pl. 3, f. 16, 1865.

*Bombay.*

**16. E. Sandwicensis,** Pease, Proc. Zool. Soc. 1860, p. 146, 1860.

Reeve, Conch. Icon. Erato, pl. 3, f. 17 a, b, 1865.

*Sandwich Islands.*

**17. E. scabriuscula,** Gray, Desc. Catal. p. 16, No. 140, 1832.

*Marginella cypræola,** Sowb., Proc. Zool. Soc. p. 57, 1832.

*Marginella granum*, Kiener, Coq. Viv. p. 17, pl. 8, f. 33, 1835.

*Erato scabriuscula*, Sowb., Conch. Illustr. f. 45, 1841. Sowb., Catal. Cypr. p. 15, No. 1, 1841. Reeve, Conch. Syst. pl. 285, f. 7, 10, 1842. C. B. Ad., Ann. N. Y. Lyc. Nat. Hist. v, 263, 1852. C. B. Ad., Cat. Shells of Panama, p. 39, 1852.

*Erato granum*, Chenu, Man. de Conchyl. i, p. 200, f. 1067, 1859.

*Erato scabriuscula*, Reeve, Conch. Icon. Erato, pl. 1, f. 4 a, b, 1865.

*W. coast of America, from St. Elena N. to Mazatlan.*

**18. E. Schmeltzeana,** Crosse, Journ. de Conch. xv, 301. pl. 11, f. 5, 1867. *Vitian Archipelago.*

**19. E. sulcifera,** Gray, Desc. Catalogue p. 16, 1832. Sowb., Conch. Illustr. f. 46, 1841. Reeve, Conch. Icon. pl. 3, f. 14 a, b, 1865.

*C. of Good Hope*, Gray; *Philippine I.*, Reeve.

E. TRIFASCIATA, Humphr., (Lachryma) is *E. lachryma*, Gray.

**20. E. vitellina,** Hinds, Moll. Voyage Sulphur. p. 46, pl. 13, f. 22, 23, 1844.

*E. vitulina*, H. and A. Ad., Genera Rec. Moll. i, p. 190, Cat. of species, 1858.

*E. vitellina*, Reeve, Conch. Icon. Erato, pl. 1, f. 3 a, b, 1865. *Magdalena, California.*

E. VITULINA, H. and A. Ad., is *E. vitellina*, Hinds.

E. VOLUTA, Mont. (Cypræa), is *E. lævis* (Don.)

B. *Fossil Species.*

E. CRASSILABRA, Conrad (Am. Journ. Conch. i, 25), is *Marginella crassilabra*, Conr.

E.? CONSTRICTA, Conrad (Am. Journ. Conch. i, 25), is *Marginella constricta*, Conr.

E. HUMEROSA, Conrad (Am. Journ. Conch. i, 25), is *Marginella humerosa*, Conr.

E. LÆVIS (Don), see among recent species.

E. MAUGERIÆ, Gray, see among recent species.

* It is a little doubtful whether Gray or Sowerby has priority; but as Sowerby afterwards adopted Gray's name, we may safely follow.

**1. E. semenoides,** Gabb, Journ. Ac. Nat. Sc. Phil. 2d ser. iv, 383, pl. 67, f. 49, Mch. 1860. *Eocene; Texas.*

**2. E. subcypræola,** Orb.

*Marginella cypræola*, Basterot (not Brocchi), Mem. Geol. p. 44, 1825. Michelotti, Foss. Terr. Mioc. del'It. Sept. p. 321, 1847.

*Erato subcypræola*, Orb., Prodromus, ii, 31, 1852. *Miocene; Piedmont.*

E. VENTRICOSA, Gray (Desc. Cat. p. 17, 1832), has not been recognized.

## Genus **MARGINELLA,** Lamarck.

*Cucumis* (in part), Klein, Tentamen, 1753.
*Porcellana** (in part), Adanson, Voyage de Senegal, p. 55, 1757.
*Peribolus* (in part), Adanson, Voyage de Senegal, p. 75, 1757.
*Voluta* (in part), Linn., Syst. Nat. ed. x, 729, 1758.
*Marginella*, Lam., Prodromus, 1799. Syst. Anim., p. 75, 1801. Ann. du Mus. ii, 60, 1802.
*Volvaria* (in part), Lam., Syst. Anim. sans Vert. vii, 362, 1822.

Including subgenera of authors, viz.:

*Persicula*, Schum., Nouv. Syst. p. 235 (type *M. persicula*, L.), 1817.
*Hyalina*, Schum., Nouv. Syst. p. 234 (type *M. pallida*, Don.), 1817.

* The name *Porcellana* was first applied to the Cowries by Rumphius in 1705, was set aside by Linnæus in favor of *Cypræa* in 1740, was taken up by Adanson in 1757 for the present genus (which he was the first to well define), and was judiciously dropped by Lamarck in 1799. Its etymology is barbarous and indecorous, and its restoration for either *Cypræa* or *Marginella* is hardly called for by any accepted law, and can only promote confusion.

As to the numerous subgenera which have been proposed for species of this genus, they seem to me to be neither useful nor well grounded. In a series of two or three hundred species it is easy to select a few salient forms for subgeneric types, but much less easy to allot all the intermediate species to their proper places under such types. All the proposed subgenera are founded on the greater or less prominence of the spire, and on the degree of the thickening or reflection of the outer lip. A very slight difference of the plane of development is all that is involved in the former character, and all students of the great family *Helicidæ* understand well how little generic value attaches to either character. An evidence of the invalidity of these distinctions is furnished in the inconsistencies of the catalogues in which they have been employed. The lingual dentition, when fully studied in a sufficient number of species, may yet guide us to proper groups; but even of this I am less hopeful than formerly.

*Volutella*, Swainson, Zool. Illust. 2d series, vol. i, No. 44 (type *M. bullata*, Lam.), 1829.

*Glabella*, Swainson, Treatise on Malacology, p. 324 (type *M. bifasciata*, Lam.), 1840.

*Gibberula*, Swainson, Treatise on Malacology, p. 323 (type *M. oryza*, Lam.), 1840.

*Volvarina*, Hinds, Proc. Lond. Zool. Soc. 1844, p. 75 (type *M. nitida*, Hinds), 1844.

*?Cystiscus*, Stimpson, Am. Jour. Conch. i, 55 (type *M.? cystiscus*, Redf.), 1865.

A. *Recent Species.*

1. **M. abbreviata,** C. B. Ad., Contrib. to Conchology, No. 4, p. 56, 1850. *Jamaica.*

2. **M. Adansoni,** Kiener.

*Narel*, Adanson, Hist. Nat. Senegal, p. 59, pl. 4, f. 2, 1757.

*M. bifasciata* (not Lam.), Sowb., Tankerville Catal. pl. 1, f. 4 (not 3), 1825.

*M. Adansoni*, Kiener, Coq. Viv. Marginella, p. 5, pl. 7, f. 27, 1835. Desh., ed. Lam. Anim. sans Vert. x, 446, 1844. Sowb., Thesaurus Conchyl. i, 375, pl. 74, f. 3, 4, 5, 1846. Orb., Dict. Univ. d'Hist. Nat. Moll. pl. 24, f. 4, 1849. Desh., Traité Elem. pl. 123, f. 11, ?1850. Chenu, Manuel de Conchyl. i, 199, f. 1048, 1859. Reeve, Conch. Icon. Marginella, pl. 7, f. 27, a, b, 1864.

*M. bifasciata* (in part), Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 11 (not 10), 1865.

*Senegal and Gambia, West Africa.*

M. AFFINIS, Beck, is *M. oryza*, Lam.

3. **M. affinis,** Reeve, Conch. Iconica, Marginella, pl. 24, f. 136, 1865. *I. St. Thomas, West Indies.*

M. ALABASTER, Reeve, is probably *M. fauna*, Sowb.

M. ALBA, C. B. Ad., is probably *M. catenata* (Mont.), bleached.

4. **M. Albanyana,*** Gaskoin, Ann. Nat. Hist., 2d ser. xi, 358, 1853. *Albany, South Africa.*

M. ALBILABRIS, Conrad, Proc. Acad. N. S. iii, 26, is probably a species of *Melampus*.

M. ALBINA, Gaskoin, is *M. turbinata*, Sowb., on authority of Reeve.

* Compare with *M. Capensis*, Dunker.

**5. M. albocincta,** Sowb., Proc. Lond. Zool. Soc. 1846, p. 96, 1846.

Sowb., Thesaurus Conch. i, 382, pl. 75, f. 48, 1846. Reeve, Conch. Icon. Marginella, pl. 19, f. 95, 1865.

*Habitat unknown.*

**6. M. albolineata,** Orb., Moll. de Cuba, ii, 99, pl. 20, f. 27—29, date?

*M. varia* (in part), Sowb., Proc. Lond. Zool. Soc. 1846, p. 97, 1846. Thesaurus Conch. i, 390, pl. 76, f. 141, 1846.

*Cuba—Jamaica—Guadaloupe.*

M. AMABILIS, Redf., is perhaps a variety of *M. oblonga*, Sw.

**7. M. amygdala,** Kiener.

*Egouen*, Adanson, Hist. Nat. Senegal, p. 59, pl. 4, f. 3, 1757.

*Voluta prunum* (in part), Gmelin, Syst. Nat. p. 3446, 1788.

*M. amygdala*, Kiener, Coq. Viv. Marginella, p. 36, pl. 11, f. 1, 1840? Sowb., Thes. Conch. i, 384, pl. 77, f. 160, 161, 162, 1846. Petit, Cat. in Jour. de Conch. ii, 53, 1851.

*M. Gambiensis*, Redf., Cat. Coll. of Marginellidæ, 1851.

*M. amygdala*, Reeve, Conch. Icon. Marginella, pl. 11, f. 43, a, b, 1864. *Senegal and Gambia, West Africa.*

**8. M. angustata,** Sowb., Encyc. Meth. pl. 376, f. 5, a, b, 1798.

*M. bullata* (not Born.), in part, Lam., Anim. sans Vert., 1st ed. vii, 360, 1822. Defrance, Dict. des Sci. Nat. xxix, 143, 1823. Kiener, Coq. Viv. p. 29, pl. 4, f. 15, 1834. Griffith's Cuvier, pl. 6, f. 16, 1834. Guerin, Iconogr. du Regne Anim. i, 33, pl. 16, f. 16, ?1844. Chenu, Leçons Element., p. 217, f. 718, 1847. Berge, Conchylienbuch, p. 240, pl. 42, f. 2, 1855.

*M. bullæa*, Cuv., Regne Anim. Illust. Moll. p. 144, pl. 52, f. 2, 2a, ?1840.

*M. Bellangeri* (not Kiener), Desh. ed. Lam. sans Vert. x, 443 (foot-note), 1844.

*M. angustata*, Sowb., Thesaurus Conch. i, 399, pl. 77, f. 169, 170, 1846. Chenu, Manuel de Conch. i, 199, f. 1052, 1859. Reeve, Conch. Icon. Marginella, pl. 13, f. 55 a, b, 1864. Küster, Syst. Conch. Cab. v, Part 4, pl. 4*, f. 10, 11, 1865. *East Africa, Ceylon, and Bay of Bengal.*

M. ANGYSTOMA of some Catalogues is *M. triplicata*, Gaskoin.

**9. M. annulata,** Reeve, Conch. Icon. Marginella, pl. 22, f. 119 a, b, 1865. *Hab. unknown.*

**10. M. apicina,** Menke, Synopsis Meth. Moll. p. 87, 1828.
*M. conoidalis*, Kiener, Coq. Viv. p. 37, pl. 12, f. 2, 1840?
*M. livida*, Hinds, Proc. Zool. Soc. 1844, p. 73, 1844.
*M. flavida*, Redf., Ann. N. Y. Lyc. Nat. Hist. iv, 163, pl. 10, f. 4, a, b, 1846.
*M. Caribæa*, Orb., Moll. de Cuba, ii, 97, pl. 20, f. 24–26, date?
*M. conoidalis*. Sowb., Thes. Conch. i, 387, pl. 76, f. 93, 94, 97 to 101, 1846. Reeve, Conch. Icon. Marginella, pl. 18, f. 87 a, b, 1865. Küster, Syst. Conch. Cab. v, part 4, pl. 3*, f. 8, 9 (badly), 1865.
*Caribbean Sea from Florida S. to Cartagena, and from Cuba eastward to Guadaloupe;* specimens varying in size, color and solidity according to locality.

M. ARENARIA, Mörch, is var. of *M. bifasciata*, Lam.
M. ASPHARI, Theobald, Cat. Shells in Mus. As. Soc. Bengal p. 30, 1860, is undescribed and hence unknown.

**11. M. attenuata,** Reeve, Conch. Icon. Marginella, pl. 22, f. 116 a, b, 1865. *Sidney and Port Jackson, Australia.*

**12. M. aurantia,** Lam., Anim. sans Vert. 1st ed. vii, 358, 1822.
*M. aurantiaca*, Defr., Dict. des Sci. Nat. xxix, 143, 1823.
*M. aurantia*, Kiener, Coq. Viv. p. 9, pl. 3, f. 11, 1834. Desh., Lam. Anim. sans Vert. x, 439, 1844. Sowb., Thes. Conch. i, 379, pl. 75, f. 49, 50, 1846. Reeve, Conch. Icon. Marginella, pl. 5, f. 16 a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 2*, f. 9—11, 1865.
*Gambia, W. Afr., and Cape de Verd Islands.*

M. AURICULATA, Menard, is *Ringicula auriculata*, Desh.

**13. M. australis,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 75, 1844.
Sowb. Thes. Conch. i, 386, pl. 75, f. 64, 65, 1846.
*M. oryza* (not Lam.), Pease, Proc. Lond. Zool. Soc. 1860, p. 147, 1860.
*M. australis*, Reeve, Conch. Icon. Marginella, pl. 16, f. 74, 1864. *N. W. Australia* (Hinds), *Sandwich I.* (Pease).

M. AVELLANA, Lam., is variety of *M. persicula*, (Linn.)

**14. M. avena,** Valenc. ined. Kiener, Coq. Viv. p. 17, pl. 6, f. 24, 1834.
*M. avenacea*, Desh., in 2d ed. Lam. Anim. sans Vert. x, 455, 1844.
*M. varia* (in part), Sowb., Thes. Conch. i, 390, pl. 76, f. 137 to 140, 1846. (In part) Sowb., Proc. London Zool. Soc. 1846, p. 47, 1846.

*M. avena*, Orb., Moll. de Cuba, ii, 98, ? 1853.
*M. Beyerleana*, Bernardi, Journ. de Conch. iv, 149, pl. 5, f. 15, 16, 1853.
*Volvaria avena*, Chenu, Manuel de Conchyl. i, 200, f. 1074, 1859.
*M. avena*, Reeve, Conch. Icon. Marginella, pl. 17, f. 83 a, b, 1865.
*M. livida*, Reeve, Conch. Icon. Marginella, pl. 20, f. 100, 1865.
*M. varia*, Küster, Syst. Conch. Cab. v, pt. 4, pl. 4*, f. 12—14, 1865.
? *M. avenacea*, Küster, Syst. Conch. Cab. v, pt. 4, pl. 4*, f. 7—9, 1865. *Caribbean Province throughout.**

M. AVENA, Sowb., is *M. Philippinarum*, Redf.
M. AVENACEA, Desh., is *M avena*, Val.
M. AZONA, Menke, is variety of *M. cornea*, Lam.

**15. M. Belcheri,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 73, 1844.
Hinds, Moll. Voyage of Sulphur, p. 45, pl. 13, f. 1—5, 1844. Sowb., Thes. Conch. i, 380, pl. 74, f. 25—27, 1846. Reeve, Conch Icon. Marginella, pl. 9, f. 33 a, b, 1864. *West Africa.*

M. BELLANGERI, Kiener, is *M. bullata*, (Born.)
M. BELLANGERI, Desh. (in 2d ed. of Lam. x, 443), is *M. angustata*, Sowb.

**16. M. Bellii,** Sowb., Thes. Conch. i, 375, pl. 74, f. 28, 29, 1846.
Reeve, Conch. Icon. Marginella, pl. 8, f. 32 a, b, 1864. *Habitat unknown, but probably West Africa.*

**17. M. Bensoni,** Reeve, Conch. Icon. Marginella, pl. 27, f. 158, 1865. *Cape of Good Hope.*

**18. M. Bernardii,** Largill., Magasin de Zool. 1845, pl. 116, 1845.
*M. onychina*, Ad. and Reeve, Voy. of Samarang. Moll. p. 29, pl. 10, f. 25, 1850.
*M. Bernardii*, Reeve, Conch. Icon. Marginella, pl. 10, f. 38 a, b, 1864. *China Sea.*

M. BEYERLEANA, Bernardi, is variety of *M. avena*, Val.
M. BIBALTEATA, Reeve, is *M. gracilis*, C. B. Ad.

* This has also been quoted by authors as from Mauritius, from New Caledonia, and from California; but probably has been confounded with *M. Delessertiana*, *M. Philippinarum*, and other species.

**19. M. bifasciata,** Lam.

? Martini, Conch. ii, pl. 42, f. 431, 1773. Enc. Meth. Vers. pl. 377, f. 8 a, b, 1798. ? Roissy, Buffon. Moll. vi, pl. 57. f. 2, 1805.

*Voluta faba, var.* Dillwyn, Descr. Cat. p. 528, 1817.

*M. bifasciata*, Lam., Anim. sans Vert. 1st ed. vii, 357, 1822. Defrance, Dict. des Sci. Nat. xxix, 142, 1823.

*Voluta marginata*, Wood, Index Test. Suppl. pl. 3, f. 8, 1828.

*M. bifasciata*, Desh., Enc. Meth. Vers. ii, 411, 1830. Kiener, Coq. Viv. Marginella, p. 4, pl. 2, f. 8, and pl. 10, f. 1, 1834 and 1840. Desh., ed. of Lam. Anim. Sans. Vert. x, 438, 1844. Sowb., Thes. Conch. i. 374, pl. 74, f. 13—15, 1846.

*M. arenaria*, Mörch, Catal. Yöldi, p. 119, 1852.

*M. bifasciata*, Chenu, Man. de Conch. i, 199, f. 1051, 1859. Reeve, Conch. Icon. Marginella, pl. 7, f. 25 a, b, c, d, 1864. (In part) Küster, Syst. Conch. Cab. v, pt. 4, pl. 1*, f. 10 (not 11), 1865. *C. Blanco to Gambia, West Africa.*

M. BIFASCIATA, Sowb., in Tankerville Catal. is *M. faba*, (Linn.)

M. BIVARICOSA, Lam., is *M. marginata*, (Born.)

**20. M. blanda,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 76, 1844.

Hinds, Moll. Voy. of Sulphur, p. 46, pl. 13, f. 14, 15, 1844. Sowb., Thes. Conch. i, 400, pl. 77, f. 167, 168, 1846. *C. Blanco, W. Africa.*

M. BOBI, Blainv., is *M. cingulata*, (Dillw.)

**21. M. bulbosa,** Reeve, Conch. Icon. Marginella, pl. 25, f. 144, Jan. 1865. *Borneo.*

**22. M. bullata,** (Born.)

Bonanni, Obs. circa Vivent, f. 13 (rude), 1691. Knorr, Vergn., iv, pl. 23, f. 1, and pl. 27, f. 9, 1768.

*Voluta bullata*, Born., Mus. p. 218, 1778. Chemnitz, x, pl. 150, f. 1409, 1410, 1788. Gmelin, Syst. Nat. p. 3452, 1788. Dillwyn, Descr. Catal. p. 531, 1817.

*Marginella bullata* (in part), Lam., Anim. sans Vert. 1st ed. vii, 360, 1822. Sowb., Tankerv. Cat. pl. 2, f. 1, 1825.

*Voluta bullata*, Wood, Index Test. pl. 20, f. 79, 1828.

*Marginella Bellangeri*, Kiener, Coq. Viv. p. 27, pl. 9, f. 41, 1834.

*Marginella bullata* (in part), Desh., ed. Lam. Anim. sans Vert. x, 442, 1844. Sowb., Thes. Conch. i, 401, pl. 77, f. 158, 159, 1846.

*Marginella Bellangeri*, Chenu, Manuel de Conchyl. i, 199, f. 1053, 1859.

*Marginella bullata*, Reeve, Conch. Icon. Marginella, pl. i. f. 2 a, b, c, 1865. Küster, Syst. Conch. Cab. v, pt. 4, pl. 4*, f. 3, 4. *Bahia, Brazil.**

M. BULLATA, Kiener, is *M. angustata*, Sowb.

**23. M. bullula,** Reeve, Conch. Icon. Marginella, pl. 25, f. 139, 1865. *Borneo.*

**24. M. Burchardi,** Dunker, Zeitschrift für Malak. 1852, p. 61, 1852.

Dunker, Novit. Conch. p. 33, pl. 11, f. 4, 1862. *Hab. unknown.*

M. BURCHARDI, Reeve, is a colorless var. of *M. strigata*, (Dillw.)

M. CÆRULESCENS, Lam., is *M. prunum*, (Gmel.)

**25. M. calculus,** Redf., Am. Journ. Conch. vol. vi, p. , 1870.

*M. guttata* (not of Dillw. or Sw.), Sowb., Thes. Conch. i, 394, pl. 78, f. 208, 209, 210, 1846.

*M. maculosa* (not of Kien.), Reeve, Conch. Icon. pl. 15, f. 65 a, b, 1865.

*St. Vincent, W. I.* (Sowb. and Reeve), *Grenadines* (Rawson).

M. CANDIDA, Sowb., is var. of *M. margarita*, Kiener.

**26. M. cantharus,** Reeve, Conch. Icon. Marginella, pl. 21, f. 110 a, b, 1865. *Hab. unknown.*

**27. M. Capensis,** Dunker, Krauss S. Afric. Moll. p. 125, pl. 6, f. 21, 1848.

Reeve, Conch. Icon. Marginella, pl. 21, f. 113, 1865. Küster, Syst. Conch. Cab. v, pt. 4, pl. 3*, f. 19 and 20, 1865. *South Africa.*

M. CAPENSIS, (Cystiscus) Stimpson is *M. cystiscus*, Redf.

**28. M. carnea,** Storer, Boston Jour. Nat. Hist. i, 465, pl. 9, f. 3, 4, 1837.

Dekay, Mollusca of N. Y. p. 152, pl. 7, f. 159, 1843. Sowb., Thes. Conch. (in part) i, 398, pl. 76, f. 103 (not 102), 1846. *Caribbean Sea, Key West, and Venezuelan coast.*

**29. M. carneola,** Petit, Journ. de Conch. ii, 50, pl. 1, f. 14, 1851. *Hab. unknown.*

* All the East Indian localities cited by authors are wrong, and belong to *M. angustata*, Sowb., often confounded with this.

M. CASTANEA, Dilw., (*Voluta*) is a doubtful species, based on a bad figure in Martini ii, pl. 42, f. 430—possibly a *Columbella*.

**30. M. catenata,** (Mont.)

*Voluta catenata*, Mont., Brit. Test. p. 236, pl. 6, f. 2, and suppl. p. 104, 1803. Mat. & Racket, Lin. Trans. viii, 133, 1807. Dillwyn, Descr. Cat. p. 527, 1817. Turton, Conch. Dict. p. 252, 1819.

*Marginella catinata*, Brown, Ill. Conch. B. G. p. 4, pl. 8, f. 14 (badly), 1827.

*Voluta catenata*, Fleming, Brit. Anim. p. 332, 1828. Wood, Index Test. p. 94, pl. 19, f. 60, 1828.

*Marginella catenata*, Kiener, Coq. Viv. p. 25, pl. 9, f. 41, (badly), 1834. Thorpe, Brit. Marine Conch. p. 221, 1844. Sowb., Thes. Conch. i, 393, pl. 78, f. 225, 226, 1846.

*Marginella alba*, (worn) C. B. Ad., Contr. Conch. p. 56, 1850.

" *catenata*, Reeve, (in part) Conch. Icon. Marginella, pl. 16, f. 73, a, b, (not 72), 1865.

*Caribbean Sea ;* Bahamas to Guadaloupe.*

M. CHEMNITZII, Dillwyn, (*Voluta*) is based on a figure in Chemnitz x. pl. 150, f. 1422, which probably represents a bleached *M. faba* or *M. bifasciata*.

**31. M. chrysomelina,** Redf., Ann. N. Y. Lyc. Nat. Hist. iv, 492, pl. 17, f. 2, Sept., 1848.

*M. pudica*, Gaskoin, Proc. Lond. Zool. Soc. 1849, p. 18, Mch, 1849.

*M. chrysomelina*, Reeve, Conch. Icon. Marginella, pl. 22, f. 121, 1865. *Caribbean Sea ; Central Am. to St. Thomas.*

**32. M. cincta,** Kiener, Coq. Viv. p. 21, pl. 8, f. 32, 1824. Sowb. Thes. Conch. i, 384, pl. 77, f. 165, 166, 1846. Chenu, Manuel de Conch. i, 199, f. 1060, 1061, 1859. Reeve, Conch. Icon. Marginella, pl. 11, f. 44, a, b, 1865.

*M. Sauleyana*, (not Petit) Reeve, Conch. Icon. Marginella, pl. 18, f. 90, a, b, 1865.

*M. cincta*, Küster, Syst. Conch. Cab. v, part 4, pl. 2* f. 7, 8, 1865. *Caribbean Sea ; Yucatan to Maracaibo.*

**33. M. cingulata,** Dillw., Bonanni, Recr. iii, f. 238, 1684. Lister, Conch. t. 803, f. 9, (rude) 1688. Petiver, Gaz. pl. 8, f. 10, 1702. Gualtieri, Test. pl. 28, f. B, 1742.

*Bobi*, Adanson, Senegal, p. 60, pl. 4, f. 4, 1757.

* The earlier references to Great Britain are now known to be erroneous.

*Voluta persicula* var. β, Linn., Syst. Nat. 12th ed. p. 1189, 1769. Knorr, Vergn. vi, pl. 21, f. 6, 1772. Martini, Conch. ii, p. , pl. 42, f. 419, 420, 1773. Var. a, Born, Mus. p. 220, Vign. p. 210, f. D, 1780. Schroeter, Mus. Gottwald, pl. 8, f. 50, a, b, c, 1782.

*Voluta persicula*, var. β, Schroeter, Einleit. i, 201, 1783.

*Murex persiculus*, Meuschen, Mus. Gevers., p. 328, No. 771, 1787.

*Voluta persicula*, var. β, Gmelin, ed. Syst. Nat. p. 3444, 1788. Enc. Meth. pl. 377, f. 4, a, b, 1798. Burrow, Elem. Conchol. pl. 15, fig. 3, 1815.

*Voluta cingulata*, Dillw., Descr. Catal. p. 525, 1817.

*Marginella lineata*, Lam. Anim. sans. Vert. vii, 361, 1822.

" *cingulata*, Swains, Zool. Illustr. 1st series ii, pl. 97, f. 1, 1822. Defrance, Dict. des. Sci. Nat. xxix, 144, 1823.

*Voluta persicula*, Mawe, Lin. Syst. Conch. pl. 23, f. 2, 1823.

*Marginella persicula*, Sowb., Genera of Shells, Marginella f. 2, 1824.

*Marginella lineata*, Crouch's Lam. pl. 19, f. 14, 1827.

" *bobi*, Blainv., Malac. pl. 30, f. 6, 1827.

" *lineata*, Blainv., plates to Dict. des Sci. Nat. pl. 44, f. 6, ? 1828.

*Voluta cingulata*, Wood, Index Testac. pl. 19, f. 56, 1828.

*Marginella lineata*. Desh., Enc. Meth. Vers. ii, 414, 1830.

*Voluta persicula*, Woodarch, Introd. Conch. pl. 2, f. 35, 1833.

*Marginella lineata*, Kiener, Coq. Viv. p. 23, pl. 5, f. 22, 1834. Wyatt, Manual Conch. pl. 30, f. 3, 1838. Reichenbach, Conch. p. 62, pl. 37, f. 532, 533, (figs. reversed) 1842. Reeve, Conch. Systemat. ii, 250, pl. 278, f. 2, 1843. Desh. ed. Lam. Anim. sans Vert. x, 445, 1844. Sowb., Thes. Conch. i, 400, pl. 78, f. 185, 186, 1846. Orbigny, Moll. des Canaries, p. 87, date ? Berge, Conchylienbuch p. 241, pl. 42, f. 5, 1855.

*Persicula fasciata*, H. and A. Ad., Gen. Recent Moll. i, 193, pl. 20, f. 3, a, 1858.

*Marginella lineata*, Chenu, Manuel Conchyl. i, 199, f. 1063, 1859.

*Marginella cingulata*, Reeve, Conch. Icon. Marginella, pl. 13, f. 56, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 3*, f. 1, ?2, 1865. *West Africa; Canaries to Gambia.*

**34. M. clandestina,** Brocchi.

*Voluta clandestina*, Conch. Foss. Subappeninn. ii, 642, pl. 15, f. 11, 1814. Savigny, Desc. de l'Egypte pl. 6, f. 26, ? 1820.

*Marginella clandestina*, Bronn, Italiens Tertiar Geb. p. 18, No. 52, 1831. Phil., Moll. Sicil. i, 231, 1836. Kiener, Coq. Viv. p. 39, pl. 13, f. 1, ? 1840. Desh., ed. Lam. Anim. sans Vert. x, 452, 1844. Phil., Moll. Sicil. ii, 197, 1844. Sowb., Thes. Conch. i, 402, pl. 78, f. 216, 1846. Chenu, Manuel de Conchyl. i, 199, f. 1066, (magnified) 1859. Küster, Syst. Conch. Cab. v, part 4, pl. 3*, f. 21, 22, 1865. Weinkauff, Conch. des Mittelmeeres, ii, 22, 1868.

*Coast of Atlantic; Portugal to Canary I. Mediterranean Sea; Gibralter to Egypt, and fossil in tertiary of Sicily and Italy.*

**35. M. Cleryi,** Petit, Guerin, Mag. de Zool. 1836, pl. 78, 1836. Kiener, Coq. Viv. p. 31, pl. 10, f. 1, ? 1840. Sowb. Thes. Conch. i, 380, pl. 74, f. 9, 10, 1846. Chenu, Manuel de Conchyl. i, 199, f. 1050, 1859. Reeve, Conch. Icon. Marginella, pl. 9, f. 37, a, b, 1864.

*Senegal.*

**36. M. compressa,** Reeve, Conch. Icon. Marginella, pl. 24, f. 130, 1865. *Hab. unknown.*

M. CONIFORMIS, Mörch, is *M. Mörchii*, Redf.

M. CONOIDALIS, Kiener, is var. of *M. apicina*, Menke.

M. CONOIDALIS, Chenu, is *M. diaphana*, Kiener.

M. CONSTRICTA, Hinds, is *M. Hindsiana*, Petit.

**37. M. contaminata,*** Gaskoin, Proc. Zool. Soc. p. 20, 1849. *Hab. unknown.*

**38. M. cornea,** Lam.

Martini ii, 103, pl. 42, f. 416, 1773. Schroeter, Mus. Gottwald. pl. 8, f. 47, 1782. Enc. Meth. Vers. pl. 376, f. 6, a, b, 1798.

*M. cornea*, Lam. Anim. sans Vert. 1st ed. vii, 360, 1822. Defrance, Dict. des Sci. Nat. xxix, 144, 1823. Desh., Enc. Meth. Vers. ii, 415, 1830. Kiener, Coq. Viv. p. 29, pl. 4, f. 17, 1834.

*M. persicula*, (*not L.*) Sowb. Conch. Manual f. 438, 1839.

*M. cornea*, Desh., ed. Lam. sans Vert. x, 144, 1844. Sowb. Thes. Conch. i, 400, pl. 78, f. 183, 184, 1846.

*M. azona*, Menke, Zeitsch. für Malak. 1849, p. 37, 1849.

*M. cornea*, Reeve, Conch. Icon. Marginella pl. 12, f. 52, a, b, 1864. Küster, Syst. Cab. v, part 4, pl. 2*, f. 4, 1865.

*Senegambia, West Africa.*

**39. M. corusca,** Reeve, Conch. Icon. Marginella pl. 25, f. 143, 1865. *Singapore.*

* Certainly very near to *M. blanda* Hinds.

M. CRASSILABRUM, Sowb. is *M. labrosa*, Redf.

M. CRASSILABRUM, Reeve, is *M. Storeria*, Couthouy.

**40. M. Cumingiana,** Petit, Revue Zool. 1841, p. 185, 1841.

*M. Cumingii*, Sowb., Thes. Conch. i, 377, pl. 74, f. 33–35, 1846.

*M. Cumingiana*, Reeve, Conch. Icon. Marginella pl. 3, f. 8, a, b, 1864.

*M. Cumingii*, Küster, Syst. Conch. Cab. v, part 4, pl. 1, f. 13, 1865. *Senegal.*

**41. M. curta,** Sowb., Proc. Lond. Zool. Soc. 1832, p. 105, 1832. Kiener, Coq. Viv. p. 12, pl. 7, f. 30, 1834. Desh., ed. Lam. sans Vert. x, 448, 1844. Sowb. Thes. Conch. i, 397, pl. 77, f. 88, 89, 1846. Reeve, Conch. Icon. Marginella pl. 6, f. 23, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 2*, f. 12–14, 1865.

*Coast of Peru and Ecuador.*

M. CYLINDRICA, Brown, (*Volvaria*) is *Bulla cylindracea*, Pennant.

**42. M. cylindrica,** Sowb. Thes. Conch. i, 390, pl. 76, f. 134, 1846.

Reeve, Conch. Icon. Marginella pl. 20, f. 105, a, b, 1865. *I. St. Thomas, W. I.*

M. CYLINDRICA, Pease, is *M. Peasii*, Reeve.

M. CYPRÆOIDES, Anton, Verzeichness p. 99 is doubtful, and perhaps an *Erato.*

M. CYPRÆOLA, Sowb., is *Erato scabriuscula*, Gray.

**43. M. cystiscus,** Redf.

*Cystiscus Capensis*,* Stimpson, Am. Journ. Conch. i, 55, pl. 8, f. 2, a, b, c, d, 1865. *C. of Good Hope.*

**44. M. dactylus,** Lam., Anim. sans Vert. 1st ed. vii, 360, 1822.

*M. dactyla*, Defrance, Dict. des Sci. Nat. xxix, 143, 1823.

*M. dactylus*, Kiener, Coq. Viv. p. 28, pl. 4, f. 16, 1834. Desh., ed. Anim. sans Vert. x, 442, 1844. Sowb. Thes. Conch. i, 401, pl. 78, f. 187, 1846. Chenu, Manuel de Conchyl. i, 199, f. 1054, 1859. Reeve, Conch. Icon. Marginella pl. 10, f. 42, a, b, 1865. *Hong Kong* (Hinds).

* This species has a shell so entirely that of a *Marginella* that I could hardly be justified in omitting it from a catalogue of this family. Yet Mr. Stimpson sees sufficient peculiarities in the soft parts of the animal to lead him to establish for it not only a new genus but a new family. Further investigation may confirm his view, and may also show that other minute species, now included in *Marginella*, should be placed in *Cystiscus.*

**45. M. DeBurghiæ,** A. Ad., Proc. Lond. Zool. Soc. 1863, p. 509, 1863.
Reeve, Conch. Icon. Marginella pl. 15, f. 68, a, b, 1865.
*Swan River, Australia.*

**46. M. Delessertiana,*** ? Petiver, Gazophyl. Nat. pl. 102, f. 13, 1711.
*M. Delessertiana*, Recluz, Revue Zool. 1841, p. 185, 1841.
*Mauritius.*

**47. M. dens,** Reeve, Conch. Icon. Marginella pl. 22, f. 120, 1865. *Borneo.*

**48. M. diadochus,** Ad. and Reeve, Voyage of Samarang Moll. p. 28, pl. 7, f. 4 (with animal), 1850.
Roberts, Popular Hist. of Moll. pl. 4, f. 3 (with animal), 1851. H. and A. Ad., Genera Recent Moll. pl. 20, f. 2 (with animal), 1858. Reeve, Conch. Icon. Marginella pl. 9, f. 35, a, b, 1864. *Straits of Sunda.*
M. DIAPHANA, Kiener, is *M. pellucida*, Pfr.
M. DIAPHANA, Küster, is *M. fauna*, Sowb., probably.
M. DONOVANI, Payr, is *Erato lævis* (Don.)

**49. M. Dunkeri,** Krauss, S. African Moll. p. 126, pl. 6, f. 23, 1848.
*M. zonata*, var. *bilineata*,† Krauss, S. African Moll. p. 126, pl. 6, f. 22, 1848.
*M. zonata*, var. Küster, Syst. Conch. Cab. v, part 4, pl. 4*, f. 18, 20, 1865.
*? M. Dunkeri*, Küster, Syst. Conch. Cab. v, part 4, pl. 4*, f. 21, 23, 1865. *South Africa.*

**50. M. effulgens,** Reeve, Conch. Icon. Marginella, pl. 20, f. 104, 1865. *I. St. Thomas, W. I.*

**51. M. electrum,** Reeve, Conch. Icon. Marginella, pl. 22, f. 118, a, b, 1865. *Hab. unknown.*

**52. M. elegans** (Gmel.)
Lister, Conch. pl. 803, f. 11 (rude), 1688. Martini, Conch. ii, 106, pl. 42, f. 424, 425 (rude), 1773.
*Voluta, No.* 98, Schrœter, Einleitung, i, 269, 1786.
*Murex monilis*, Meusch., Mus. Gevers. p. 328, No. 773, 1787
*Voluta elegans*, Gmel. ed. Syst. Nat. p. 3448, 1788.

* The oriental analogue of the Caribbean *M. albolineata*, Orb.; and hardly to be distinguished from it. Should they prove to be identical Recluz's name must prevail.

† The two forms figured by Krauss seem to me to be the same species, both well distinguished from *M. zonata*, Kiener.

*Voluta cancellata*, var. Schreibers, Conchylien-kenntniss, i, 118, 1793.

*Voluta elegans*, Dillw., Descript. Catal. p. 531, 1817.

*Voluta elegans*, Wood, Index Testac. pl. 20, f. 69 (bad copy of Martini), 1828.

*Marginella elegans*, Kiener, Coq. Viv. p. 15, pl. 8, f. 35, 1834.

*Marginella bullata*, Reichenbach, Conch. p. 62, pl. 37, f. 530, 531 (figures reversed and rude), 1842.

*Marginella elegans*, Reeve, Conch. Systemat. ii, 249, pl. 277, f. 5, 6, 1843. Catlow, Pop. Conchology, p. 251 (wood-cut), 1843. Desh. ed. Lam. Anim. sans Vert. x, 450, 1844. (In part) Sowb., Thes. Conch. i, 385, pl. 77, f. 147 (*not* 148, 149), 1846. Chenu, Manuel de Conchyl. i, 199, f. 1056, 1859. Reeve, Conch. Icon. Marginella, pl. 2, f. 4, a, b, 1864. *Indian Ocean.*

**53. M. elliptica,** Redf. Here proposed for

*Volutella elongata*, Pease,* Am. Jour. Conch. iii, 281, pl. 23, f. 23, Apr., 1868.

*I. Fanning.*

M. ELONGATA, Pease (*Volutella*), is *M. elliptica*, Redf.

**54. M. encaustica,** Reeve, Conch. Icon. Marginella, pl. 26, f. 148, a, b, 1865. *Ceylon.*

M. EPIGRUS, Reeve, is *M. exilis* (Gmel.)

**55. M. evanida,** Sowb., Thes. Conch. i, 388, pl. 75, f. 69, 1846.

Reeve, Conch. Icon. Marginella, pl. 25, f. 142, 1865.

*Hab. unknown.*

**56. M. exilis** (Gmel.)

*? Falier*, Adanson, Senegal, p. 78, pl. 5, f. 2, 1757. Martini, Conch. ii, pl. 42, f. 427, 1773.

*Voluta No.* 100, Schrœter, Einleitung, i, 270, 1786.

*Voluta exilis*, Gmelin, ed. Syst. Nat. p. 3444, 1788. Dillwyn, Descript. Catal. p. 525, 1817.

*Volvaria triticea* (var. excl.), Lam., 1st ed. Anim. sans Vert. vii, 363, 1822.

*Voluta monilis* (not Linn.), Wood, Index Testac. pl. 19, f. 54 (copied from Martini), 1828.

*Marginella triticea*, Kiener, Coq. Viv. p. 19, pl. 6, f. 25, 1834.

*Volvaria triticea*, Reichenbach, Conch. p. 60, pl. 29, f. 500 (badly copied from Martini), 1842.

* Pease's name is preoccupied for a fossil species.

*Volvaria triticea* (var. excl.), Desh. ed. Lam. sans Vert. x, 460, 1844. Chenu, Manuel de Conchyl. i, 200, f. 1070, 1859.

*Marginella epigrus*, Reeve, Conch. Icon. Marginella, pl. 26, f. 151, 1865.

*? Marginella triticea*, Küster, Syst. Conch. Cab. v, part 4, pl. 4*, f. 1, 2, 1865. *West Africa, Mogadore to Senegal.*

M. EXILIS, Chiaje (*Voluta*) is *M. secalina*, Phil.

**57. M. faba** (Linn.)

Lister, Conch. t. 812, f. 22 (rude), 1688. Petiver, Gazophyl. pl. 10, f. 5 (immature, and figure rude), 1702. Gualt. Test. pl. 28, f. Q (good), 1742.

*Narel*, Adanson, Senegal, p. 59, pl. 4, f. 2, 1757.

*Voluta faba*, Linn., Syst. Nat. 10th ed. p. 730, No. 355, 1758. Knorr, Vergnugen, iv, pl. 17, f. 6, 1768. Linn., Syst. Nat. 12th ed. p. 1189, 1769. Martini, Conch. ii, 42, f. 432, 433, 1773.

*Voluta faba*, Born, Mus. p. 221, 1780. Mus. Gottwald, pl. 25, f. 170, a, b, c, d, e, 1782. ? Favanne, pl. 24, f. H, 1780.

*Voluta faba*, Schrœter, Einleitung, i, 212, 1783.

*Murex faba*, Meusch., Mus. Gevers. p. 328, No. 780, 1787.

*Voluta faba*, Gmelin, ed. Syst. Nat. p. 3445, 1788.

*Voluta faba*, Schreibers, Conch. i, 115, 1793. Enc. Meth. pl. 377, f. 1, a, b, 1798. Roissy, Buffon, Moll. vi, 9, 1805.

*Voluta faba* (var. excl.), Dillw., Descr. Catal. p. 528, 1817.

*Marginella faba*, Lam., Anim. sans Vert. vii, 357, 1822. Defrance, Dict. des Sci. Nat. xxix, 142, 1823.

*Marginella bifasciata*, Sowb. (not Lam.), Tankerville Catal. pl. 2, f. 3 (not 4), 1825.

*Marginella faba*, Blainv., Malac. pl. 30, f. 5, 1827. Blainv., Plates to Dict. des Sci. Nat. Moll. pl. 44, f. 5, 1828. ?

*Voluta faba*, Wood, Index Testac. pl. 20, f. 63, 1828.

*Marginella faba*, Desh., Enc. Meth. Vers. ii, 412, 1830. Kiener, Coq. Viv. p. 3, pl. 2, f. 7, 1834. Reichenbach, Conch. p. 62, pl. 37, f. 528, 529 (figures reversed), 1842. Desh. ed. Lam. Anim. sans Vert. x, 439, 1844. Sowb., Thes. Conch. i, 373, pl. 74, f. 1, 2, 1846. Reeve, Conch. Icon. Marginella, pl. 7, f. 24, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 12, 1865.

*Senegambia.*

M. FABA, Chenu, is *M. pseudofaba*, Sowb.

M. FASCIATA, Schum. (*Persicula*), is *M. persicula*, (Linn.)

**58. M. fasciata,** Sowb., Thes. Conch. i, 389, pl. 76, f. 142, 1846.
Chenu, Manuel de Conchyl. i, 197, f. 1041, 1859.
*Hab. unknown.*

**59. M. fauna,** Sowb., Proc. Lond. Zool. Soc. 1846, p. 96, 1846.
Sowb., Thes. Conch. i, 391, pl. 76. f. 126, 127, 1846.
*? M. alabaster*, Reeve, Conch. Icon. Marginella, pl. 21, f. 107, 1865.
*? M. diaphana*, Küster (not Kiener), Syst. Conch. Cab. v, part 4, pl. 4*, f. 5, 6, 1865.
*Caribbean; Cuba and Curacoa.*

**60. M. festiva,** Kiener, Coq. Viv. p. 32, pl. 10, f. 4, ? 1840.
Sowb., Thes. Conch. i, 382, pl. 75, f. 72, 73, 1846.
*M. gemma*, A. Ad., Proc. Lond. Zool. Soc. 1855, p. 122, 1855.
*M. festiva*, Chenu, Manuel Conchyl. i, 197, 1859. Reeve, Conch. Icon. Marginella, pl. 19, f. 93, 94, a, b, 1865.
*East Africa* (Reeve).
M. FLAVIDA, Redf., is var. of *M. apicina*, Menke.
M. FLUCTUATA, C. B. Ad., is *M. sagittata*, Hinds.

**61. M. formicula,** Lam., Anim. sans Vert. 1st ed. vii, 359, 1822.
Defrance, Dict. des Sci. Nat. xxix, 143, 1823. Kiener, Coq. Viv. p. 6, pl. 3, f. 13, 1834. Desh. ed. Lam. sans Vert. x, 441, 1844. Sowb., Thes. Conch. i, 376, pl. 75, f. 41, 42, 1846. Reeve, Conch. Icon. Marginella, pl. 8, f. 28, a, b, 1864. *Seas of Australia and Tasmania.*

**62. M. frumentum,** Sowb., Proc. Lond. Zool. Soc. 1832, p. 57, 1832.
Sowb., Thes. Conch. i, 393, pl. 78, f. 221, 222, 1846. Reeve, Conch. Icon. Marginella, pl. 15, f. 71, 1865.
*Coast of Ecuador.*

**63. M. fulminata,** Kiener, Coq. Viv. p. 33, pl. 12, f. 1, ? 1840.
Sowb., Thes. Conch. i, 370, pl. 78, f. 173, 1846. Reeve, Conch. Icon. Marginella, pl. 13, f. 54, a, b, 1864.
*Bahia, Brazil.*

**64. M. fusca,** Sowb., Proc. Lond. Zool. Soc. 1846, p. 95, 1846.
Sowb., Thes. Conch. i, 392, pl. 76, f. 122, 123, 1846. Reeve, Conch. Icon. Marginella, pl. 17, f. 82, 1865.
*West Indies.*

**65. M. fusiformis,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 75, 1844.

Hinds, Moll. Voyage Sulphur, p. 46, pl. 13, f. 20, 21, 1844. Sowb., Thes. Conch. i, 382, pl. 75, f. 76, 77, 1846. Reeve, Conch. Icon. Marginella, pl. 17, f. 79, 1865. *I. Bourbon* (Desh.), *Sts. of Malacca* (Hinds).

M. GAMBIENSIS, Redf., is var. of *M. amygdala*, Kiener.

M. GEMMA, A. Ad., is var. of *M. festiva*, Kiener.

**66. M. glabella** (Linn.)

Lister, Conch. t. 818, f. 29, 1688. Gualteri, Test. pl. 23, f. L (rude), 1742. Klein, Ostr. pl. 5, f. 92, 1753.

*Porcelaine*, Adanson, Senegal, p. 56, pl. 4, f. 1 (showing animal), 1757.

*Voluta glabella*, Linn., Syst. Nat. ed. 10, p. 730, No. 356, 1758. Linn., Mus. Ulricæ, p. 594, 1764. Knorr, Vergnugen. iv, pl. 21, f. 3, 1768.

*Voluta glabella*, Linn., Syst. Nat. 12th ed. p. 1189, 1769. Martini, Conch. ii, 111, pl. 42, f. 429 (good), 1773.

*Voluta glabella*, Born, Mus. p. 221, 1780. Mus. Gottwald, pl. 25, f. 171, a, b, 172, a, b, 1782.

*Voluta No.* 16, Schrœter, Einleitung, i, 213, 1783.

*Voluta glabella*, Schrœter, Kennt. Conch. und Foss. ii, 106, 1785. Chemnitz, Conch. ix, 55, pl. 104, f. 890, 891 (reversed var.), 1786.

*Murex pyrulus*, Meusch., Mus. Gevers. p. 328, No. 779, 1787.

*Voluta glabella*, Gmelin, ed. Syst. Nat. p. 3445, 1788. Encyc. Meth Vers. pl. 377, f. 6, a, b, 1798. Roissy, Buffon Moll. vi, 8, 1805.

*Voluta glabella*, Brookes, Introd. Conch. pl. 6, f. 73, 1815. Schum., Nouv. Syst. p. 235, 1817.

*Voluta glabella*, Dillw., Descr. Catal. p. 529, 1817.

*Marginella glabella*, Bors, Mem. Real Acad. Tours, xxv, 208, 1820.

*Marginella glabella*, Lam., Anim. sans Vert. 1st ed. vii, 355, 1822. Defrance, Dict. des Sci. Nat. xxix, 140, 1823. Sowb., Genera of Shells, Marginella, f. 1, 1824. Bosc., Hist. de Coq. v, 39, pl. 38, f. 4, 5, 1824.

*Voluta glabella*, Wood, Index Testac. pl. 20, f. 64, 1828.

*Marginella glabella*, Desh., Encycl. Meth. Vers. ii, 409, 1830. Fr. Hoffmann, in Karst. Arch. iii, 386, 1831. Orb., Moll. des Iles Canaries, p. 87, 1834. Kiener, Coq. Viv. p. 6, pl. 1, f. 1, 2 (with animal from Adanson), 1834. Sowb., Conch. Manual, f. 437, 1839. Reichenbach,

Conch. p. 62, pl.37, f. 523 (reversed by blunder), 1842. Reeve, Conch. System. ii, 250, pl. 278, f. 1, 1843. Desh., ed. Lam. Anim. sans Vert. x, 435, 1844. Sowb., Thes. Conch. i, 378, pl. 75, f. 52—54, 1846. Mrs. Gray, Figs. Moll. Anim. ii, 102, f. 12, 12a (copy from Adanson), 1850. H. and A. Ad., Genera Rec. Moll. pl. 20, f. 2a, 1858. Chenu, Manuel Conchyl. i, 197, f. 1043, 1859. Reeve, Conch. Icon. Marginella, pl. 1, f. 1, 1865. Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 2, 3, 1865.

*Canaries and C. de Verd I.; West African Coast, from Mogadore to Gambia; also fossil in upper tertiary of Italy.*

M. GLANS, Menke, is dwarf var. of *M. prunum* (L.)

**67. M. Goodallii,** Sowb., Tankerv. Catal. pl. 2, f. 2, 1825.

*Voluta Goodallii*, Wood, Index Testac. suppl. pl. 3, f. 7, 1828.

*Marginella Goodallii*, Kiener, Coq. Viv. p. 7, pl. 7, f. 29, 1834. Reeve, Conch. System. ii, 250, pl. 277, f. 8, 9, 1843. Desh., ed. Lam. Anim. sans Vert. x, 449, 1844. Sowb., Thes, Conch. i, 378, pl. 74, f. 16, 17, 1846. Reeve, Icon. Conch. Marginella, pl. 3, f. 9, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 4, 5, 1865.

*Senegal* (Cuming).

**68. M. gracilis,** C. B. Ad., Ann. N. Y. Lyc. Nat. Hist. v, 46, 1851. C. B. Ad., Contr. to Conch. p. 130, 1851.

*M. bibalteata*, Reeve, Conch. Icon. Marginella, pl. 20, f. 99, 1865. *Bahamas and Jamaica.*

M. GRANUM, Kiener, is *Erato scabriuscula*, Gray.

**69. M. granum,** Philippi, Jahrzeit für Malakozool. 1849, p. 27, 1850. *Aden, Red Sea.*

**70. M. Guancha,** Orb., Moll. des Iles Canaries, p. 88, pl. 6, f. 32—34, 1834. *Madeira and Canary I.*

**71. M. Guillaini,** Petit, Journ. de Conch. ii, 50, pl. 1, f. 13, 1851. *Abd-el-Gouri, near Red Sea.*

**72. M. guttata** (Dillw.)

Sloane, Nat. Hist. Jamaica, ii, 230, No. 10, 1725. Martini, Conch. ii, 104, pl. 42, f. 417, 418, 1773. Schrœt., Mus. Gottwald, pl. 8, f. 51, a, 1782.

*Voluta persicula*, var. γ, Schrœter, Einleitung, i, 211, 1783. Gmelin, ed. Syst. Natura, p. 3444, 1788.

*Voluta persicula*, var. β, Schreibers, Conch. Kennt. i, 114, 1793.

*Voluta guttata*, Dillwyn, Desc. Catal. p. 526, 1817.

*Marginella longivaricosa*, Lam., 1st ed. Anim. sans Vert. vii, 358, 1822. Defrance, Dict. des Sci. Nat. xxix, 143, 1823.

*Voluta guttata*, Wood, Index Testac. pl. 19, f. 57 (bad), 1828.

*Marginella longivaricosa*, Desh., Encyc. Meth. Vers. ii, 412, 1830. Kiener, Coq. Viv. p. 21, pl. 3, f. 12, 1834. Hanley, Conchol. Book Species, p. 120 (bad), 1842. Desh. ed. Lam. Anim. sans Vert. x, 441, 1844. Sowb., Thes. Conch. i, 397, pl. 76, f. 112, 113, 1846. Orb., Moll. de Cuba, ii, 95, 1853.

*Marginella guttata*, Reeve, Conch. Icon. Marginella, pl. 12, f. 50, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 3*, f. 3, 4, 1865.

*Caribbean; Bahamas E. to Tortola, and S. to Honduras.*

M. GUTTATA, Sowb., is *M. calculus*, Redf.

M. GUTTATA, Swainson, is *M. phrygia*, Sowb.

**73. M. guttula,** Reeve, Conch. Icon. Marginella, pl. 20, f. 101, 1865. *Hab. unknown.*

M. HAINESII, Petit, is var. of *M. quinqueplicata*, Lam.

**74. M. harpæformis,** Beck (ined.), Sowb. Thes. Conch. i, 374, pl. 74, f. 7, 8, 1846.

Reeve, Conch. Icon. Marginella, pl. 8, f. 31, a, b, 1864. *Senegal.*

**75. M. helmatina,** Rang, Guerin's Mag. de Zoologie, 1832, pl. 5, 1832.

Kiener, Coq. Viv. p. 10, pl. 7, f. 28, 1834. Desh. ed Lam. sans Vert. x, 448, 1844. Sowb., Thes. Conch. i, 377, pl. 75, f. 38, 39, 1846. Reeve, Conch. Icon. Marginella, pl. 3, f. 7, a, b, 1864. *Senegal.*

**76. M. hematita,** Kiener, Coq. Viv. p. 11, pl. 7, f. 31, 1834. Sowb., Thes. Conch. i, 380, pl. 75, f. 60, 61, 1846.

*Erato hematina*, Reeve, Conch. Icon. Erato, pl. 2, f. 8, a, b, 1865.

*Marginella hematita*, Küster, Syst. Conch. Cab. v, part 4, pl. 2*, f. 18, 19, 1865. *Caribbean; Porto Rico.*

**77. M. Hindsiana,** Petit.

*M. constricta*,* Hinds, Proc. Lond. Zool. Soc. 1844. p. 74, 1844. Sowb., Thes. Conch. i, 383, pl. 77, f. 156, 157, 1846.

*M. Hindsiana*, Petit, Cat. in Journ. de Conch. ii, 54, 1851.

*M. constricta*, Reeve, Conch. Icon. Marginella, pl. 19, f. 96, a, b, 1865. *Hab. unknown.*

* Preoccupied by *M. constricta*, Conrad, a fossil species.

**78. M. Hondurasensis,** Reeve, Conch. Icon. Marginella, pl. 19, f. 97, a, b, 1865. *Caribbean; Honduras.*

**79. M. imbricata,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 76, 1844.

Sowb., Thes. Conch. i, 396, pl. 78, f. 211, 212, 1846.

*M. Vautieri*, Bernardi, Journ. de Conch. iv, 68, pl. 2, f. 13, 14, 1853.

*M. imbricata*, Reeve, Conch. Icon. Marginella, pl. 14, f. 59, a, b, 1864. *Pacific coast of Mexico; at Acapulco.*

**80. M. immersa,** Reeve, Conch. Icon. Marginella, pl. 21, f. 109, 1865. *Hab. unknown, probably Indian Ocean.*

**81. M. inconspicua,** Sowb., Thes. Conch. i, 387, pl. 75, f. 80, 1846.

Reeve, Conch. Icon. Marginella, pl. 25, f. 141, 1865. *Hab. unknown.*

**82. M. infans,** Reeve, Conch. Icon. Marginella, pl. 26, f. 150, a, b, 1865. *Singapore.*

**83. M. inflexa,** Sowb., Thes. Conch. i, 389, pl. 76, f. 132, 1846.

Reeve, Conch. Icon. Marginella, pl. 20, f. 106, 1865. *Hab. unknown.*

**84. M. intermedia** (Menke).

*Volvaria intermedia*, Menke, Synops. Meth. Moll. p. 88, 1828. *Hab. unknown.*

M. INTERMEDIA, Sowb., is probably a colorless or bleached var. of *M. pyrum* (Gron.), or of *M. vittata*, Reeve.

M. INTERRUPTA, Lam., is *M. interrupte-lineata*, Megerle.

**85. M. interrupte-lineata,*** )Megerle.)

*? Duchon*, Adanson, Senegal, p. 61, pl. 4, f. 5, 1757.

*Voluta interrupte-lineata*, Megerle von Muhlfeld, Berlin Mag. viii, 1818.

*M. interrupta*, Lam., Anim. sans Vert. 1st ed. vii, 362, 1822. Defrance, Dict. des Sci. Nat. xxix, 144, 1823. Desh., Encycl. Meth. Vers. ii, 414, 1830. Kiener, Coq. Viv. p. 25, pl. 5, f. 21, 1834. Desh. ed. Lam. Anim. sans Vert. x, 446, 1844. Sowb., Thes. Conch. i, 395, pl. 78, f. 201—205, 1846. Orb., Moll. de Cuba, ii, 97, 1853. Reeve, Conch. Icon. Marginella, pl. 14, f. 62, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 3*, f. 16—18, 1865.

* Unwillingly do I yield Lamarck's name to this earlier but clumsily constructed title.

*Western coast of S. America from Cartagena to Demarara: perhaps also West Africa.*

**86. M. irrorata,** Menke.

? Martini, Conch. ii, pl. 42, f. 430, 1773.

*M. irrorata*, Menke, Synops. Meth. Moll. p. 88, 1828. Sowb., Thes. Conch. i, 378, pl. 75, f. 43, 55, 1846. Reeve, Conch. Icon. Marginella, pl. 5, f. 18, a, b, 1864.

*Senegal and Gambia, W. A.*

**87. M. Jewettii,** Carpenter, Proc. Lond. Zool. Soc. 1856, p. 207, 1856.

Reeve, Conch. Icon. Marginella, pl. 26, f. 146, 1865.

*California: Monterey to Santa Barbara* (Carp.); *also fossil in post-pliocene of St. Pedro* (Gabb).

**88. M. Kieneriana,** Petit, Mag. de Zoologie, 1838, pl. 110, 1838.

Kiener, Coq. Viv. p. 44, pl. 12, f. 4, ? 1840. Sowb., Thes. Conch. i, 396, pl. 78, f. 198—200, 1846. Reeve, Conch. Icon. Marginella, pl. 14, f. 63, a, b, 1865.

*Coast of Venezuela; at La Guayra.*

**89. M. labiata,** Val., ined. Kiener, Coq. Viv. p. 35, pl. 11, f. 2, ? 1840.

Reeve, Conch. System. ii, 249, pl. 277, f. 7, 1842. Desh., ed. Lam. Anim. sans Vert. x, 447, 1844. Sowb., Thes. Conch. i, 396, pl. 76, f. 104, 105, 1846. Reeve, Conch. Icon. Marginella, pl. 6, f. 21, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 2*, f. 2, 3, 1865.

*Coast of Campeachy and Yucatan.*

**90. M. labrosa,** Redf. Here proposed for

*M. crassilabrum*, Sowb.,* Proc. Lond. Zool. Soc. 1846, p. 96, 1846. Sowb., Thes. Conch. i, 392, pl. 76, f. 124, 125, 1846. *West Indies.*

**91. M. lachryma,** Reeve, Conch. Icon. Marginella, pl. 27, f. 159, 1865. *Borneo.*

**92. M. lachrymula,** Gould.

*Gibberula lachrymula*, Gould, Proc. Bost. Nat. Hist. Soc. viii, 281, Feb., 1862. Gould, Otia Conchologica, p. 238, 1862. *Off coast of Georgia* (400 fathoms).

**93. M. lactea,** Kiener, Coq. Viv. p. 42, pl. 13, f. 3, ? 1840.

* It is with reluctance that I change Sowerby's name, but it is twice preoccupied for fossil species, Conrad and Lea having each used it about 1833, with slight difference in termination.

Desh. ed. Lam. Anim. sans Vert. x, 454, 1844. Sowb., Thes. Conch. i, 390, pl. 76, f. 143, 144, 1846.

*Caribbean; Bahamas to Guadeloupe.*

M. LACTEA, Reeve, is *M. subtriplicata*, Orb.

M. LÆVIS, Desh., is *Erato lævis* (Don.)

**94. M. Largillieri,** Kiener, Coq. Viv. p. 43, pl. 11, f. 3, ? 1840.

Desh. ed. Lam. Anim. sans Vert. x, 455, 1844. Sowb., Thes. Conch. i, 402, pl. 78, f. 178—180, 1846. Reeve, Conch. Icon. Marginella, pl. 6, f. 22, a, b, 1864.

*Bahia, Brazil.*

**95. M. Lavalleana,*** Orb., Mollusques de Cuba, pl. 20, f. 36—38, date ?

*M. minima*, Guilding, ined. Sowb., Thes. Conch. i, 388, pl. 78, f. 220, 1846.

*M. Lavalleana*, Orb., Moll. de Cuba, text, ii, 101, 1853. Reeve, Conch. Icon. Marginella, pl. 27, f. 133, 1865.

*Caribbean; Jamaica to St. Vincents.*

**96. M. Lefevrei,** Bernardi, Journ. de Conch. iv, 360, pl. 12, f. 11, 12, 1853. *Hab. unknown.*

**97. M. lepida** (Gould).

*Glabella lepida*, Gould, Proc. Bost. Nat. Hist. Soc. vii, 384, Dec., 1860. Gould, Otia Conchologica, p. 139, 1862.

*China Sea.*

**98. M. lilacina,** Sowb., Thes. Conch. i, 402, pl. 78, f. 176, 177, 1846.

Reeve, Conch. Icon. Marginella, pl. 14, f. 60, a, b, 1864.

*Hab. unknown.*

**99. M. limbata,** Lam.

Mus. Gottwald. pl. 25, f. 169, a, b, d, 1782.

Encycl. Meth. pl. 376, f. 2, a, 3, b, 1798.

*M. limbata*, Lam., Anim. sans Vert. 1st ed. vii, 356, 1822. Defrance, Dict. des Sci. Nat. xxix, 142, 1823. Kiener, Coq. Viv. p. 9, pl. 2, f. 6, 1834. Desh., ed. Lam. Anim. sans Vert. x, 438, 1844. Sowb., Thes. Conch. i, 376,

* The plates of Ramon de la Sagra's Cuba, of which d'Orbigny's Mollusques form a part, were published in fasciculi *without date*, before the appearance of the text. In such cases authors justly forfeit right of priority over names published under open dates. In this instance Sowerby, in 1846, quotes Orbigny's *M. Lavalleana* as a synonym. On this ground only do I infer that it is older than Guilding's name, which had hitherto been unedited. I am not without suspicion that this species is identical with Pfeiffer's *M. minuta*, from Cuba.? Whether the Mediterranean shell which passes under that name be the same, I cannot decide.

pl. 74, f. 18–20, 1846. Chenu., Manuel de Conch. i, 197, f. 1045, (reversed) 1859. Reeve, Conch. Icon. Marginella pl. 3, f. 10, a, b, 1864. *Gambia.*

M. LINEATA, Lam., is *M. cingulata*, (Dillw.)

**100. M. lineato-labrum,** Gaskoin, Proc. Lond. Zool. Soc. 1849, p. 20, 1849. *Hab. unknown.*

**101. M. liturata,** Menke, Moll. Nov. Holl. p. 28, 1843. *W. coast of Australia.*

M. LIVIDA, Hinds, is *M. apicina*, Menke.
M. LIVIDA, Reeve, is var. of *M. avena*, Val.
M. LONGIVARICOSA, Lam., is *M. guttata*, (Dillw.)

**102. M. Loroisii,*** Bernardi, Journ. de Conch. v, 291, pl. 8, f. 6, 7, 1857. *Hab. unknown.*

**103. M. maculosa,** Kiener, Coq. Viv. p. 26, pl. 9, f. 40, 1834.
*M. muralis*, Hinds, Proc. Lond. Zool. Soc. 1844, p. 76, 1844. Sowb., Thes. Conch. i, 394, pl. 78, f. 217, 1846. Reeve, Conch. Icon. Marginella pl. 15, f. 69, 1865.
*Caribbean; Jamaica, Curaçoa, St. Vincent and Tortola.*

M. MACULOSA, Reeve, is *M. calculus*, Redf.

**104. M. margarita,** Kiener, Coq. Viv. p. 15, pl. 9, f. 42, 1834.
Sowb., Thes. Conch. i, 383, pl. 75, f. 66, 67, 1846.
? *M. candida*,† Sowb., Thes. Conch. i, 382, pl. 75, f. 86, 87, 1846.
*M. margarita*, Reeve, Conch. Icon. Marginella pl. 16, f. 78, and pl. 23, f. 123, 1865.
? *M. candida*, Reeve, Conch. Icon. Marginella pl. 24, f. 134, 1865. *Caribbean; Cuba to St. Vincents.*

**105. M. margaritula,** Carpenter, Cat. Mazatlan Shells in Brit. Mus. p. 462, 1857. *Mazatlan, Gulf of Calif.*

**106. M. marginata,** (Born.)
*Voluta marginata*, Born, Mus. p. 220, pl. 9, f. 5, 6, 1780. Favanne, Conch. pl. 29, f. E, 1780.
*Voluta marginata*, Schrœter, Einleitung i, 300, No. 224, 1786.
*Voluta marginata*, Gmelin., ed. Syst. Nat. p. 3449, 1788.
*Voluta marginata*, Schreibers, Conch. i, 123, 1793.
Encycl., Meth. pl. 376, f. 9, a, b, 1798.

* Notwithstanding the five plaits mentioned in Bernardi's description but not so apparent in his plate, I suspect this is only a dwarfed and worn specimen of *M. cincta*, Kiener.

† I can see no distinctive characters between Sowerby's and Kiener's species.

*Voluta marginata*, Dillw., Descr. Cat. p. 528, 1817.
*M. bivaricosa*, Lam., 1st ed. Anim. sans Vert. vii, 358, 1822. Defrance, Dict. des Sci. Nat. xxix, 143, 1823.
*Voluta marginata*, Mawe. Lin. Syst. Conch. pl. 23, f. 3, 1823.
*M. bivaricosa*, Sowb. Genera of Shells, Marginella, f. 3, 1824.
*Voluta marginata*, Wood, Index Testac. pl. 19, f. 62, 1828.
*M. bivaricosa*, Desh., Enc. Meth. Vers. ii, 412, 1830. Kiener, Coq. Viv. p. 20, pl. 3, f. 10, 1834.
" *marginata*, Reeve, Conch. Syst. ii, 250, pl. 278, f. 3, 1843.
" *bivaricosa*, Desh., ed. Lam. Anim. sans Vert. x, 439, 1844. Sowb., Thes. Conch. i, 384, pl. 77, f. 171, 172, 1846. Desh., Traité Elem. pl. 123, f. 12, ?1850.
" *marginata*, Orb., Moll. de Cuba ii, 96, 1853.
" *bivaricosa*, Chenu, Manuel de Conch. i, 199, f. 1057, 1058, 1859.
" *marginata*, Reeve, Conch. Icon. Marginella pl. 11, f. 46, a, b, 1864. *Senegal*, (authors.)

**107. M. Mariei,** Crosse, Journ. de Conch. xv, 177, pl. 5, f. 2, 1867. *New Caledonia.*

**108. M. Martini,*** Petit, Journ. de Conch. iv, 367, pl. 11, f. 8, 1853. *Rio Janeiro.*

**109. M. micans,** Petit, Journ. de Conch. ii, 48, pl. 1, f. 15, 16, 1851. *Abd-el-Gouri, near Red Sea.*

M. MILIACEA, Lam., (*Volvaria*) is *M. miliaria*, Linn.

**110. M. miliaria,** (Linn.)
*Voluta miliaria*, Linn., Syst. Nat. 10th ed. p. 730, No. 354, 1758. Linn., Syst. Nat. 12th ed. p. 1139, 1769. ? Martini, ii, pl. 42, f. 428, 1773. Schrœter, Einleitung i, 209, 1783. Gmelin, ed. Syst. Nat. p. 3443, 1788. Savigny, Moll. de l'Egypte, pl. 6, f. 17, 18, 1820.
*Volvaria miliacea*, Lam., Anim. sans Vert. 1st ed. vii, 364, 1822. Payr., Cat. de Corse p. 168, pl. 8, f. 28, 29, 1826.
*Voluta miliaria*, Wood, Index Testac. p. 93, pl. 19, f. 52, (bad) 1828.
*M. miliacea*, Kiener, Coq. Viv. p. 19, pl. 6, f. 26, (var. excl.) 1834. Desh., Exp. en. Moree, p. 202, 1835.
*Volvaria miliacea*, Phil., Moll. Sicil, i, 232, 1836.
*Marginella miliacea*, " " " ii, 197, 1844.
*Volvaria miliacea*, Desh., ed. Lam. Anim. sans Vert. x, 461, 1844.

* Perhaps only a variety of *M. prunum*, Gmel.

*Marg. miliaria*, (var. excl.) Sowb. Thes. Conch. i, 399, pl. 78, f. 230, (not 227–229) 1846. Orb. Prodromus iii, 170, 1852. Reeve, Conch. Icon. Marginella pl. 27, f. 154, (bad) 1865. Weinkauff, Conch. des Mittelmeeres ii, 20, 1868. *Eastern Atlantic, from Cadiz to Canary I.*; *Mediterranean, from Gibraltar to Egypt. Also fossil in Post Pliocene, Upper and Middle Tertiary of Southern Europe.*

M. MINIMA, Sowb., ex Guilding is *M. Lavalleana*, Orb.

**111. M. minor**, C. B. Ad., Ann. N. Y. Lyc. Nat. Hist. v, 264, June 1852.

C. B. Ad., Panama Shells p. 40, Aug. 1852. Carpenter, Cat. Mazatlan Shells, p. 461, 1857. Reeve, Conch. Icon. Marginella pl. 27, f. 152, 1865.

*Pacific Coast of Central America, from Mazatlan to Panama.*

**112. M. minuta**, Pfr.,* Wiegmann's Archiv. i, 259, 1840. Phil., Moll. Sicil. ii, 197, pl. 27, f. 23, 1844. Weinkauff, Conch. des Mittelmeere ii, 21, 1868.

*Mediterranean; Algeria to Syria, also fossil in Post Pliocene of Southern Europe.*

**113. M. monilis**, (Linn.)

*? Simeri*, Adanson, Senegal, p. 79, pl. 5, f. 3, 1757.

*Voluta monilis*, Linn., Syst. Nat. 10th ed. p. 730, No. 353, 1758. Linn., Syst. Nat. 12th ed. p. 1189, 1769. Martini, Conch. ii, 42, f. 426, 1773.

*Voluta monilis*, Born, Mus. p. 219, 1780. Schrœter, Einleitung i, 209, 1783. (var. excl.) Gmel., Syst. Nat. p. 3444, 1788. Schreibers, Conch. i, 114, 1793. Dillw., Desc. Cat. p. 524, 1817.

*Volvaria monilis*, Lam., Anim. sans Vert. 1st ed. vii, 363, 1822.

*Marg. monilis*, Blainv., Malac. pl. 27, f. 3, 1827. Kiener, Coq. Viv. p. 18, pl. 6, f. 23, 1834.

*Volvaria monilis*, Wyatt, Man. Conch. pl. 29, f. 3, (bad) 1838. Desh. ed. Lam. sans Vert. x, 459, 1844.

*? Marg. monilis*, Sowb.,† Thes. Conch. i, 388, pl. 76, f. 117, 118, 1846.

* See note under *M. Lavalleana*.

† Petit sees in Sowerby's figure and description sufficient ground to exclude them from the synonymy of this species, and proposes to separate Sowerby's shell under the name *Soverbyana*. In revising the somewhat perplexing figures which have been given of *monilis*, I find Sowerby's figures as near the truth as most others. As to the habitat I am in doubt. Linnæus refers the species to *China*. Most authors ascribe it to *Senegal*, but Petit denies that it occurs there, though he admits that Sowerby's

*? Marg. Soverbianum*, Petit, Journ. de Conch. ii, 53, 57, 1851.
*Volvaria monilis*, Chenu, Manuel de Conch. i, 200, f. 1071, 1859.
*Marg. monilis*, Reeve, Conch. Icon. Marginella pl. 21, f. 111, (Desc. excl.) 1865.
*? China*, (Linnæus.) *? Senegal*, (authors.)

M. MONILIS, Wood, (*Voluta*) is *M. pulchella*, Kiener.

**114. M. Morchii,** Redf., here proposed, Mörch's name being preoccupied.*
*Gibberula coniformis*, Mörch, Malak. Blatt. 1860, p. 86.
*Hab. unknown.*

**115. M. mosaica,** Sowb., Thes. Conch. i, 381, pl. 75, f. 58, 59, 1846.
Reeve, Conch. Icon. Marginella pl. 4, f. 12, a, b, c, 1864.
*West Africa, ?* (Petit.) *East Africa*, (Reeve;) the latter more probable.

**116. M. multilineata,** Sowb., Proc. Lond. Zool. Soc. 1846, p. 96, 1846.
Sowb., Thes. Conch. i, 395, pl. 78, f. 192, 193, 1846.
Reeve, Conch. Icon. Marginella pl. 14, f. 64, 1865.
*Belize, Honduras.*

M. MURALIS, Hinds, is *M. maculosa*, Kiener.

**117. M. muscaria,** Lam., Anim. sans Vert. 1st ed. vii, 359, 1822.
*M. musca*, Defrance, Dict. des Sci. Nat. xxix, 143, 1823.
*M. muscaria*, Desh., Enc. Meth. Vers. ii, 413, 1830. Kiener, Coq. Viv. p. 11, pl. 3, f. 14, 1834. Pot. and Mich., Galerie des Moll. 504, pl. 35, f. 17, 18, 1838. Desh. ed. Lam. sans Vert. x, 441, 1844. Sowb., Thes. Conch. i, 376, pl. 75, f. 45–47, 1846. Reeve, Conch. Icon. Marginella pl. 8, f. 29, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 2*, f. 15–17, 1865.
*Australia and Tasmania.*

**118. M. musica,** Hinds, Proc. Lond. Zool. Soc. p. 73, 1844.
Hinds. Moll. Voyage Sulphur p. 44, pl. 13, f. 8, 9, 1844.
Sowb., Thes. Conch. i, 379, pl. 75, f. 36, 37, 1846.
Reeve, Conch. Icon. Marginella pl. 9, f. 34, a, b, 1864.
*C. Blanco, West Africa.*

M. NAVICELLA, Reeve, is *M. rubella*, C. B. Ad.

type does. May it not be that this shell, like some of the cowries, is an East Indian species, though employed in Africa for ornament or commercial barter? Adanson says of his *Simeri*, that it is worn by the natives in necklaces.

* By Sowerby, for a fossil species.

**119. M. neglecta,** Sowb., Thes. Conch. i, 390, pl. 76, f. 135, 136, 1846.

Reeve, Conch. Icon. Marginella pl. 25, f. 138, 1865.

*I. Bourbon*, Desh.

**120. M. Newcombi,** Reeve, Conch. Icon. Marginella pl. 5, f. 15, a, b, 1864. *Cape of Good Hope.*

**121. M. nitida,** (Hinds.)

*Volvarina nitida*, Hinds, Proc. Lond. Zool. Soc. 1844, p. 75, 1844.

*Mary. nitida*, Sowb., Thes. Conch. i, 389, pl. 76, f. 131, 1846. Reeve, Conch. Icon. Marginella pl. 17, f. 80, 1865.

*Hab. unknown.**

**122. M. nivea,** C. B. Ad., Contr. to Conchology p. 56, 1850. *Jamaica.*

**123. M. nivosa,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 74, 1844.

Sowb., Thes. Conch. i, 398, pl. 76, f. 109, 110, 1846. Reeve, Conch. Icon. Marginella pl. 6, f. 20, a, b, 1864.

*West Indies*, Reeve.

**124. M. nodata,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 73, 1844.

Hinds, Moll. Voyage Sulphur. p. 44, pl. 13, f. 6, 7, 1844. Sowb., Thes. Conch. i, 379, pl. 74, f. 30, 1846. Chenu, Manuel de Conch. i, 197, f. 1042, 1859. Reeve, Conch. Icon. Marginella pl. 9, f. 36, a, b, 1864.

*C. Blanco, West Africa.*

M. NUBECULATA, Lam., is *M. pyrum*, (Gron.)

**125. M. obesa,** Redf., Ann. N. Y. Lyc. Nat. Hist. iv, 164, pl. 10, f. 5, a, b, Apr. 1846.

*M. similis*, Sowb., Proc. Lond. Zool. Soc. 1846, p. 97, Nov. 1846. Thes. Conch. i, 396, pl. 78, f. 206, 207, Nov. 1846. Reeve, Conch. Icon. Marginella pl. 14, f. 61, 1865. Küster, Syst. Conch. Cab. v, part 4, pl. 3*, f. 10–12, 1865.

*M. obesa*, Küster, Syst. Conch. Cab. v, part 4, pl. 3*, f. 13—15, 1865.

*St. Martha, S. A.* (Redf.) *Brazil*, (Sowb.)

M. OBESA, Sowb., is *M. pyrulata*, Redf.

* I have a specimen received from Cuming ticketed "*Malta*," but I doubt its authority.

**126. M. oblonga,*** Swains., Zool. Ill. 2d ser. i, pl. 44, f. 1, (*Volutella*) 1829.

Sowb., Thes. Conch. i, 398, pl. 76, f. 106, 107, 1846.

*M. carnea* (not Storer) Sowb. in part. Thes. Conch. i, 398, pl. 76, f. 102, 114 (not 103), 1846.

*M. amabilis*, Redf., Ann. N. Y. Lyc. Nat. Hist. v, 225, 1852.

*M. oblonga*, Reeve, Conch. Icon. Marginella pl. 12, f. 51, a, b, 1864. *Bahamas and Yucatan.*

**127. M. obscura,** Reeve, Conch. Icon. Marginella pl. 24, f. 132, 1865. *Hab. unknown.*

**128. M. obtusa,** Sowb., Thes. Conch. i, 374, pl. 74, f. 11, 12, 1846. *Hab. unknown, but of a West African type.*

**129. M. Odoricyi,** Bernardi, Journ. de Conch. iii, 59, pl. 2, f. 6, 7, 1852. *Hab. unknown.*

**130. M. olivæformis,** Kiener, Coq. Viv. p. 12, pl. 8, f. 36, 1834.

Desh., ed. Lam. Anim. sans Vert. x, 449, 1844. Sowb., Thes. Conch. i, 392, pl. 77, f. 163, 164, 1846. Reeve, Conch. Icon. Marginella pl. 6, f. 19, a, b, 1864. *Senegal.*

**131. M. olivella,** Reeve, Conch. Icon. Marginella pl. 25, f. 140, a, b, 1865. *Australia.*

M. ONYCHINA, Ad. and Reeve, is *M. Bernardii*, Larg.

**132. M. ornata,** Redf. Here proposed for

*M. vittata*,† Reeve, (not Edwards) Conch. Icon. Marginella pl. 5, f. 17, a, b, c, d, 1864. *East Africa.*

**133. M. oryza,** (Lam.)

*? Stipon*, Adanson, Senegal, p. 79, pl. 5, f. 4, 1757.

*Voluta monilis*, var. *β*, Gmelin, ed. Syst. Nat. p. 3444, 1788.

Encyc., Meth. Vers. pl. 374, f. 6, a, b, 1798.

*Voluta miliaria*, (syn. excl.) Dillw., Descr. Cat. p. 524, 1817.

* Among the varied forms usually referred to this species, three are prominent: 1st, one which may be regarded as the type, and which answers well to Swainson's somewhat magnified figure; this is sometimes flecked a little with white, after the manner of *M. guttata*, Dillw. 2d, the shell which I have formerly discriminated as *M. amabilis*, represented by figs. 102 and 114 of Sowerby's *Thesaurus*, and mistaken by him for *M. carnea*. 3d, a form more attenuated anteriorly, figured by Sowerby (Thes. f. 106, 107) as the type. Reeve's figure approaches the first of these forms. I much incline to regard the three as distinct species. If so considered, the third might take the name of *M. rostrata*. *M. carnea* (Thes. f. 103) is certainly distinct from either of the above.

† Preoccupied by Edwards in 1852 for a fossil species.

*Volvaria oryza*, Lam. Anim. sans Vert. 1st ed. vii, 364, 1822.
*Marg. miliacea*, var. Kiener, Coq. Viv. p. 20, pl. 6, f. 26, v, (bad) 1834.
*Volvaria oryza*, Desh., ed. Lam. Anim. sans Vert. x, 460, 1844.
*Marg. miliaria*, (*in part*) Sow., Thes. Conch. i, 399, pl. 78, f. 227, 228, 229, (good) 1846.
*Marg. oryza*, Reeve, Conch. Icon. Marginella, pl. 16, f. 75, 1865. *Senegal.*

M. ORYZA, Pease, is *M. australis*, Hinds.

**134. M. ovuliformis,** Orb., Moll. de Cuba, ii, 101, pl. 20, f. 33—35, ? 1853. *Caribbean; St. Thomas to Martinique.*

**135. M. ovulum,** Sowb., Thes. Conch. i, 401, pl. 78, f. 188, 1846.
Reeve, Conch. Icon. Marginella, pl. 23, f. 129, 1865. *Eastern Australia.*

**136. M. ovum,** Reeve, Conch. Icon. Marginella, pl. 18, f. 89, a, b, 1865. *Hab. unknown.**

**137. M. Pacifica,** Pease, Am. Jour. Conch. iii, 280, pl. 23, f. 20, Apr., 1868. *I. Paumotus.*

**138. M. pallida** (Donovan).
*Bulla cylindracea* (not Pennant), Da Costa (Syn. excl.), Brit. Conch. p. 31, pl. 2, f. 7, 1778.
*Bulla pallida* (not of L.), Donovan, Brit. Shells (Syn. plur. excl.), pl. 66, f. 527, 1800.
*Voluta pallida*, Mont., Brit. Shells, p. 232 (Syn. part. excl.), 1803. Adams, Lin. Trans. iii, 253, 1803. Mat. & Rackett, Lin. Trans. viii, 132 (syn. excl.), 1807. Dillw., Desc. Catal. p. 527 (syn. in part excl.), 1817.
*Hyalina pellucida*, Schum., Nouv. Syst. p. 234, 1817.
*Volvaria pallida*, Lam., Anim. sans Vert. 1st ed. vii, 363 (syn. in part excl.), 1822. Crouch's Lamarck Ill. pl. 19, f. 15, 1827. Fleming, British Animals, p. 333, 1828. Desh. Encyc. Meth. Vers. iii, 1148 (syn. part excl.), 1830. Guerin, Icon. du Regne Anim. i, 33, pl. 16, f. 14, a, b, date? Griffith's Cuvier, Moll. pl. 6, f. 14, 14a, 1834.
*Marg. pallida*, Kiener, Coq. Viv. p. 40, pl. 13, f. 2, 1840.
*Volvaria pallida*. Thorpe, Brit. Mar. Conch. p. 221, 1844. Desh. ed. Lam. Anim. sans Vert. (syn. in part excl.) x, 459, 1844. Orb., Dict. Univ. d'Hist. Nat. Moll. pl. 24, f. 2, 3 (good), 1849.

* Reeve's figure has the aspect of a fossil species.

*Marg. pallida*, Sowb., Thes. Conch. i, 390, pl. 76, f. 108, 1846. Desh., Traité Elem. pl. 123, f. 4, 5, ? 1850. Orb., Moll. de Cuba, ii, 100, 1853.

*Volvaria pallida*, Berge, Conchylien-Buch, p. 241, pl. 42, f. 6, 1855.

*Volvaria pellucida*, H. and A. Ad., Gen. Rec. Moll. i, 194, pl. 20, f. 5, a, 1858.

*Volvaria pallida*, Chenu, Manuel de Conch. i, 200, f. 1073, 1859.

*Marg. pallida*, Reeve, Conch. Icon. Marginella, pl. 17, f. 86, 1865. *Caribbean;* Bermudas, Bahamas to Guadeloupe.*

M. PALLIDA, Linn.† (*Bulla*), of 10th ed., and *Voluta* of 12th ed., are doubtful species.

M. PALLIDA, Chiaje (*Voluta*), in Poli. Test. Sic., is a doubtful species, possibly *M. monilis*. (L.)

**139. M. Paumotensis,** Pease, Am. Journ. Conch. iii, 281, pl. 23, f. 22, Apr., 1868. *I. Paumotus, Pacific Ocean.*

**140. M. paxillus,** Reeve, Conch. Icon. Marginella, pl. 24, f. 133, a, b, 1865. *Hab. unknown.*

**141. M. Peasii,** Reeve.

*M. cylindrica*, Pease (preoccupied), Proc. Lond. Zool. Soc. 1862, p. 244, 1862.

*M. Peasii*, Reeve, Conch. Icon. Marginella, pl. 21, f. 108, a, b, 1865.

*M. polita*, Pease (preoccupied), Am. Journ. Conch. iii, 280, pl. 23, f. 19, 1867. *Kingsmill Group, Pacific O.*

M. PELLUCIDA, Schum. (*Hyalina*), is *M. pallida* (Linn.)

**142. M. pellucida,** Pfr., Wiegmann's Archiv. 1840, p. 258, 1840.‡

*M. diaphana*, Kiener, Coq. Viv. p. 38, pl. 12, f. 3, ? 1840.

*M. diaphana*, Sowb. Thes. Conch. i, 387, pl. 76, f. 95, 96, 1846.

*M. conoidalis*, Chenu (not Kiener), Manuel de Conchyl. i, 197, f. 1046, 1859.

*M. diaphana*, Reeve, Conch. Icon. Marginella, pl. 16, f. 76, 1865. Küster, Syst. Conch. Cab. v, part 4, pl. 2*, f. 20, 21, 1865. *Caribbean; Bahamas to St. Thomas.*

* This species, like *M. catenata*, was by early English writers erroneously referred to the British Seas, but its true habitat is now well known.

† Hanley, in his Ipsa Linnæi Conchylia, has well shown that none of the Linnæan references can be applied to Donovan's *M. pallida*.

‡ In cases of doubtful priority like this, the author who publishes *without date* is justly placed after the one who *dates*.

**143. M. persicula** (Linn.)

Bonanni, Recr. iii, f. 246, 1684. Lister, Conch. t. 803, f. 10 (rude), 1688. Petiver, Gazoph. pl. 8, f. 2 (rude), 1702. Gualteri, Test. pl. 28, f. C, D, E, 1742.

*Voluta persicula*, Linn., Syst. Naturæ, 10th ed. p. 730, No. 352 (in part), 1758; 12th ed. p. 1189 (in part), 1767. Martini, Conch. ii, p. 105, pl. 42, f. 421 (good), 1771.

*Voluta persicula*, var. β, Born., Mus. p. 220, 1780. Schrœter, Mus. Gottw. pl. 8, f. 48, a, b (? young, f. 49, a, b, c, d), 1782.

*Voluta persicula*, var. α, Schrœter, Einleitung, i, 210, 1783.

*Murex persiculus*, var. Meuschen, Mus. Gevers. p. 328, No. 772, 1787. Schreibers, Conch. i, 114, 1788.

*Voluta persicula* (var. excl.), Gmel. ed. Syst. Nat. p. 3444, 1788. Enc. Meth. Vers. pl. 377, f. 3, a, b (and var.), f. 5, a, b, 1798. Roissy, Buff. Moll. vi, 9, 1805. Dillw., Descr. Catal. p. 525, 1817.

*Persicula variabilis*, Schum., Nouv. Syst. p. 235, 1817.

*Marg. persicula*, Lam., Anim. sans Vert. 1st ed. vii, 361, 1822.

*Marg. avellana*, Lam., Anim. sans Vert. 1st ed. vii, 360, 1822.

*Marg. persicula*, Defrance, Dict. des Sci. Nat. xxix, 144, 1823.

*Marg. avellana*, Defrance, Dict. des Sci. Nat. xxix, 144, 1823.

*Voluta persicula*, Wood, Index Testac. pl. 19, f. 55, 1828.

*Voluta porcellana*, Wood (not Chemn.), Index Testac. pl. 19, f. 58, 1828.

*Marg. persicula*, Desh., Encycl. Meth. Vers. ii, 414, 1830. Kiener, Coq. Viv. p. 23, pl. 5, f. 19, 1834.

*Marg. avellana*, Kiener, Coq. Viv. p. 22, pl. 4, f. 18, 1834. Desh. ed. Lam. Anim. sans Vert. x, 444, 1844.

*Marg. persicula*, Desh. ed. Lam. Anim. sans Vert. x. 444, 1844. Sowb., Thes. Conch. 1, 399, pl. 78, f. 189—191, 1846. Chenu, Manuel de Conch. i, 199, 1859. Reeve, Conch. Icon. Marginella, pl. 13, f. 57, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 3*, f. 5, and var. f. 6, 7, 1865. *Senegambia.*

**144. M. Petitii,** Duval, Revue Zool. 1841, p. 279, 1841. Sowb., Thes. Conch. i, 377, pl. 74, f. 31, 32, 1846. Reeve, Conch. Icon. Marginella, pl. 3, f. 6, a, b, 1864. *Senegal.*

**145. M. Philippinarum,** Redf.

*M. avena*, Sowb. (not Val.), Thes. Conch. i, 391, pl. 76, f. 130, 1846.

*M. Philippinarum*, Redf., Ann. N. Y. Lyc. Nat. Hist. iv. 492, pl. 17, f. 3, 1848. Reeve, Conch. Icon. Marginella, pl. 17, f. 84, 1865. *Philippine Islands.*

**146. M. phrygia,** Sowb.

*M. guttata*, Swains. (not Dillw. or Sowb.), Zool. Illust. 2d ser. i, pl. 44, f. 2, 1829.

*M. phrygia*, Sowb., Thes. Conch. i, 394, pl. 78, f. 218, 219, 1846.

*M. Swainsoniana*, Petit, Cat. in Jour. de Conch. ii, 55, 1851.

*M. phrygia*, Reeve, Conch. Icon. Marginella, pl. 15, f. 67, 1865. *Acapulco and Gulf of California.*

M. PICTA, Dillw., is *M. pyrum* (Gron.)

**147. M. piperata,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 72, 1844.

*M. piperita*, Sowb., Thes. Conch. i, 381, pl. 75, f. 40, 44, 1846.

*M. piperata*, Reeve, Conch. Icon. Marginella, pl. 4, f. 11, a, b, 1864. *Natal, and East Africa.*

**148. M. pisum,** Reeve, Conch. Icon. Marginella, pl. 27, f. 156, 1865. *Australia.*

M. PLUMBEA (Sol.), MSS., is *M. prunum* (Gmel.)

**149. M. polita,** Carpenter, Cat. of Mazatlan Shells, p. 462, 1857. *Mazatlan.*

M. POLITA, Pease, is *M. Peasii*, Reeve.

**150. M. porcellana** (Gmel.)

*Voluta porcellana*, Gmel. ed. Syst. Nat. p. 3449, 1788. Chemn., Conch. x, 164, pl. 150, f. 1419, 1420 (good), 1788. Schreibers, Conch. i, 99, 1793. Encyc. Meth. Vers. pl. 377, f. 5, 1798. Dillw., Desc. Catal. p. 526, 1817.

*Marginella tessellata*, Lam., Anim. sans Vert. 1st ed. vii, 361, 1822. Defrance, Dict. des Sci. Nat. xxix, 144, 1823.

*Voluta tessellata*, Wood, Index Testac., Suppl. pl. 3, f. 31, 1828.

*Marginella tessellata*, Desh., Encycl. Meth. Vers. ii, 413, 1830. Kiener, Coq. Viv. p. 24, pl. 5, f. 20, 1834. Desh., ed. Lam. Anim. sans Vert. x, 446, 1844. Sowb., Thes. Conch. i, 395, pl. 78, f. 194—197, 1846. Chenu, Manuel de Conch. i, 199, f. 1064, 1859.

*Marginella porcellana*, Reeve, Conch. Icon. Marginella, pl. 13, f. 53, a, b, 1864. *Venezuela** (Sowb.)

* Earlier writers refer this species to the Indian Ocean, but the type is an Atlantic one, and I believe Sowerby to be correct.

**151. M. Poucheti,*** Petit, Journ. de Conch. ii, 46, pl. 1, f. 3, 1851. *West Africa.*

**152. M. pruinosa,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 74, 1844.

Sowb., Thes. Conch. i, 398, pl. 76, f. 111, 1846. Reeve, Conch. Icon. Marginella, pl. 18, f. 88, 1865.

*West Indies* (Hinds, Sowb. and Reeve.)

**153. M. prunum** (Gmel.)

Martini, Conch. ii, 110, pl. 42, f. 422, 423, (good) 1773.

*Voluta No.* 97, Schrœter, Einleitung i, 269, 1783.

*Voluta prunum*, Gmel., ed. Syst. Nat. p. 3446, (in part) 1788. Encycl. Meth. Vers. pl. 376, f. 8, a, b, 1798.

*Voluta plumbea*, Solander, ined. quoted by Dillwyn.

" *prunum*, Dillwyn, Descr. Cat. p. 530, 1817.

*Marginella cœrulescens*, Lam. Anim. sans Vert. 1st ed. vii, 356, 1822. Defrance, Dict. des Sci. Nat. xxix, 142, 1823.

*Voluta prunum*, Wood, Index Testac. pl. 20, f. 68, 1828.

*M. cœrulescens*, Desh., Encyc. Meth. Vers. ii, 411, 1830. Kiener, Coq. Viv. p. 13, pl. 1, f. 4, 1834.

(var.) *M. glans*, Menke, Synops, Meth. Mollusc. p. 146, 1836.

*M. cœrulescens*, Reichenbach, Conch. p. 62, pl. 37, f. 526, 527, (figs. reversed) 1842. Catlow, Popular Conch. p. 250, (wood cut) 1843. Desh., ed. Lam. Anim. sans Vert. x, 437, 1844. Sowb., Thes. Conch. i, 383, pl. 77, f. 153, 154, 1846. Orb., Moll. de Cuba ii, 96, 1853. Berge, Conchylienbuch p. 240, pl. 42, f. 4, 1855.

*M. prunum*, Reeve, Conch. Icon. Marginella, pl. 11, f. 45, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 9, 1865.

*M. subcœrulea*† of some Catalogues.

*Caribbean; Jamaica to Guadaloupe, and Cartagena to Curacoa!*

**154. M. pseudo-faba,** Sowb., Proc. Lond., Zool. Soc. 1846, p. 96.

Sowb., Thes. Conch. i, 374, pl. 74, f. 21, 22, 1846.

*M. faba*, (not Linn.) Chenu, Lecons. Elément. p. 217, f. 720,

* Nearly allied to *M. glabella*, but seems distinct.

† This species is often catalogued as *M. subcœrulea*, Martini. A reference to Martini ii, p. 102, will show that the name is there employed only as an explanatory phrase, and in no wise deserves precedence as a scientific binomial. Another specimen of the *same species* is in the same passage called *albida*, with just as good reason for acceptance! As to the erroneous statements regarding its habitat, growing out of Gmelin's confounding two species, see Am. Journ. Conch. v, 90.

1847. (not Linn.) Chenu, Manuel de Conch. i, 197, f. 1049, 1859.

*M. pseudofaba*, Reeve, Conch. Icon. Marginella, pl. 7, f. 26, a, b, 1864. *Gambia, West Africa.*

M. PUDICA, Gaskoin, is *M. chrysomelina*, Redf.

**155. M. puella,** (Gould.)

*Volvarina puella*, Gould, Proc. Bost. Nat. Hist. Soc. vii, 385, 1860. Gould, Otia Conchologica p. 139, 1862.
*Simon's Bay.*

**156. M. pulchella,** Kiener.

*Voluta monilis,* (not Linn.) Wood, Index Testac. pl. 19, f. 53, 1828.

*Marg. pulchella*, Kiener, Coq. Viv. p. 27, pl. 9, f. 40, 1834. Sowb., Thes. Conch. i, 393, pl. 78, f. 213—215, 1846. Reeve, Conch. Icon. Marginella, pl. 15, f. 66, 1865.
*Sidney, Australia,* (authors.)

**157. M. pulcherrima,** Gaskoin, Proc. Lond. Zool. Soc. 1849, p. 21, 1849.

*M. catenata*, (in part) Reeve, Conch. Icon. pl. 16. f. 72, (not 73, a, b,) 1865.
*West Indies,* (Gaskoin.) *Bahamas,* (Redf.)

**158. M. pulchra,** Gray.

? Lister, Conch. t. 817, f. 28, 1688.

*M. pulchra*, Gray, Zool. Beechey's Voy., p. 135, pl. 36, f. 20, 1839. Sowb., Thes. Conch. i, 383, pl. 77, f. 152, 1846. Reeve, Conch. Icon. Marginella, pl. 10, f. 39, a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 2*, f. 1, 1865.
*St. Domingo,* (Reeve.) *La Guayra,* (Swift.)

**159. M. pumila,** Redf. Here proposed for

*Volvaria pusilla*, H. Ad.,* Proc. Lond. Zool. Soc. 1867, p. 303, pl. 19, f. 1, 1867.
*Mauritius.*

**160. M. punctulata,** Petit, Revue Zool. Cuv. Soc. 1841, p. 185, 1841. *Senegal.*

M. PUSILLA, H. Ad., (Volvaria) is *M. pumila*, Redf.

**161. M. pygmæa,** Sowb., Thes. Conch. i, 386, pl. 75, f. 78, 79, 1846.

Reeve, Conch. Icon. Marginella, pl. 23, f. 125, 1865.
*Hab. unknown.*

* Adams' name is preoccupied by F. E. Edwards, for a fossil species.

**162. M. pyriformis,** (Carp.)

*Volutella pyriformis*, Carp., Journ. de Conch. xiii, 148, 1865. *Monterey to St. Diego; California.*

M. PYRIFORMIS, Pease, is *M. translata*, Redf.

**163. M. pyrulata,** Redf.

*M. obesa*, (not Redf.) Sowb.,* Thes. Conch. i, 397, pl. 76, f. 91, 92, 1846.

*M. pyrulata*, Redf., Ann. N. Y. Lyc. Nat. Hist. iv, 494, 1848. *Hab. unknown.*

**164. M. pyrulum,** Reeve,† Conch. Icon. Marginella, pl. 22, f. 117, 1865. *I. St. Thomas, W. I.*, (Reeve.)

**165. M. pyrum,** (Gron.)

Lister, Conch. i, 818, f. 32, 1688. Klein, Ostrac. Tentamen, pl. 5, f. 92, 1753. Knorr, Vergnug. v, pl. 23, f. 3, 1771. Martini, Conch. ii, pl. 42, f. 434, 435, 1773.

*Voluta, No.* 1318, Gronovius, Zooph. p 298, 1781.

*Voluta pyrum*, Gronovius, Zooph. Expl. tabul. pl. 19, f. 13, 14, 1781.

*Murex pallidus*, Meuschen, Mus. Gevers. p. 328, No. 774, 1787.

*Voluta glabella*, var. ε, Gmel. ed. Syst. Nat. p. 3445, 1788. Encycl. Meth. Vers. pl. 377, f. 2 a, b, 1798.

*Voluta picta*, Dillw., Desc. Cat. p. 529, 1817.

*Marginella nubeculata*, Lam., Anim. sans Vert. vii, 356, 1822. Defrance, Dict. des Sci. Nat. xxix, 141, 1823.

*Voluta picta*, Wood, Index Testac. p. 94, pl. 20, f. 65, 1828.

*M. nubeculata*, Desh., Encycl. Meth. Vers. ii, 410, 1830. Kiener, Coq. Viv. p. 8, pl. 1, f. 3, 1834. ? Griffith, Cuvier, pl. 6, f. 15 (*bad*), 1834. Guerin, Regne Anim. illust. Moll. p. 145, pl. 52, f. 3, 3 a, ? Reichenbach, Conch. p. 62, pl. 37, f. 524, 525 (*one figure reversed*), 1842. Reeve, Conch. Syst. ii, 249, pl. 277, f. 4, 1843. Desh. ed. Lam. Anim. sans Vert. x, 436, 1844. Reeve, Elements of Conch. p. 53, pl. 1, f. 1, 1846.

*M. nubecula*, Sowb., Thes. Conch. i, 380, pl. 75, f. 51, 1846.

*M. intermedia*, Sowb., Thes. Conch. i, 381, pl. 74, f. 6, and pl. 76, f. 90, 1846.

*M. nubeculata*, Chenu, Lecons Elément. p. 217, p. 719, 1847. Berge, Conchylienbuch, p. 240, pl. 42, f. 3, 1855.

* Sowerby's name was preoccupied. A species allied to *M. labiata*, but the figure in Sowb. has much the appearance of a fossil shell. Reeve does not figure it.

† Near *M. miliacea*.

*M. nubecula*, Chenu, Manuel de Conch, i, 197, f. 1044, 1859.
*M. pyrum*, Reeve, Conch. Icon. Marginella, pl. 4, f. 13 a, b, c, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 8, 1865. *East Africa.*

**166. M. quadrilineata,** Gaskoin, Proc. Lond. Zool. Soc. 1849, p. 17, 1849.
Reeve, Conch. Icon. Marginella, pl. 12, f. 48 a, b, 1864. *Hab. unknown.*

**167. M. quinqueplicata,** Lam.*
Kammerer, Rudolst. Cab. pl. 3, f. 4, 5, 1789. Encyc. Meth. pl. 376, f. 4 a, b, 1798.
*M. quinqueplicata*, Lam., Anim. sans Vert. 1st ed. vii, 356, 1822. Defrance, Dict. des Sci. Nat. xxix, 142, 1823. Schub. and Wagn., Chemn. p. 91, pl. 225, f. 4008, 4009, 1829. Desh., Encyc. Meth. Vers. ii, 410, 1830. Kiener, Coq. Viv. p. 13, pl. 2, f. 5, 1834. Souleyet, Voyage Bonite, pl. 45, f. 13, 15 (*animal*), 1841. Desh. ed. Lam. Anim. sans Vert. x, 437, 1844. Sowb., Thes. Conch. i, 385, pl. 77, f. 145, 146, 1846. Mrs. Gray, Fig. Moll. Anim. ii, pl. 83 a, f. 4 (ex *Souleyet*), 1850. Desh., Traité Elément. pl. 123, f. 9, ? 1850.
*M. vermiculata*, Redf., Catal. Coll. Marg. (*worn shell*), Jan. 1851.
*M. Hainesii*, Petit, Journ. de Conch. ii, 260, pl. 8, f. 5, 6, July, 1851.
*M. quinqueplicata*, Chenu, Manuel de Conch. i, 199, f. 1059, 1859. Reeve, Conch. Icon. Marginella, pl. 10, f. 40 a, b, 41 a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 1, 1865.
*Bay of Bengal, Malacca and Sumatra.*
M. RADIATA, Lam., is *Voluta zebra*, Leach.

**168. M. Reeveana,** Petit.
*M. splendens*,† Reeve, Conch. Syst. ii, pl. 277, f. 2, 3, 1843. Sowb., Thes. Conch. i, 375, pl. 74, f. 23, 24, 1846.
*M. Reeveana*, Petit, Cat. in Journ. de Conch. ii, 51, 1851.
*M. splendens*, Reeve, Conch. Icon. Marginella, pl. 8, f. 30 a, b, 1864. *West Africa*, Reeve.

**169. M. regularis,** Carpenter, Ann. and Mag. Nat. Hist. xv, 398, 1865. *California; Monterey to St. Diego.*
M. RETUSA, Brown (*Volvaria*), is *Bulla retusa.*

* Several perplexing forms are ranged under this type, some of which may prove to be good species. See note under *M. ventricosa.*
† Reeve's name was preoccupied by Grateloup in 1833 for a fossil species.

**170. M. ros,** Reeve, Conch. Icon. Marginella, pl. 26, f. 147, 1865. *Hab. unknown.*

**171. M. roscida,** Redf., Proc. Ac. Nat. Sci. Phil. xii, 174, 1860. *Coast of S. Carolina.*

**172. M. rosea,** Lam.

Petiver, Gazoph. pl. 102, f. 10 (*rude*), 1711. Martini, Conch. ii, 113, pl. 42, f. 431, 1773.

*M. rosea*, Lam., Anim. sans Vert. 1st ed. vii, 356, 1822. Defrance, Dict. des Sci. Nat. xxix, 142, 1823. Desh., Encycl. Meth. Vers. ii, 411, 1830. Kiener, Coq. Viv. p. 8, pl. 2, f. 9, 1834.

*M. nubeculata* (not Lam.), Guerin, Icon. du Regne Anim. i, 33, pl. 16, f. 15, ?

*M. rosea*, Desh. ed. Lam. Anim. sans Vert. x, 438, 1844. Sowb., Thes. Conch. i, 381, pl. 75, f. 56, 57, 1846. Krauss, Sud Afrik. Moll. p. 125, 1848. Reeve, Conch. Icon. Marginella, pl. 4, f. 14 a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 6, 7, 1865.

*South Africa.*

**173. M. rubella,** C. B. Ad., Proc. Bost. Nat. Hist. Soc. ii, 1, Jan. 1845.

Sowb., Thes. Conch. i, 391, pl. 76, f. 133, 1846.

*M. navicella*, Reeve, Conch. Icon. Marginella, pl. 20, f. 103 a, b, 1865.

*Jamaica* (Adams); *St. Thomas, W. I.* (Krebs.)

**174. M. rufescens,** Reeve, Conch. Icon. Marginella, pl. 21, f. 112, 1865. *Hab. unknown.*

**175. M. rufula,** Gaskoin, Ann. Nat. Hist. 2d ser. xi, 359, 1853.

Reeve, Conch. Icon. Marginella, pl. 26, f. 149 a, b, 1865.

*C. of Good Hope* (Reeve).

**176. M. sagittata,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 76, 1844.

Sowb., Thes. Conch. i, 393, pl. 78, f. 223, 224, 1846.

*M. fluctuata*, C. B. Ad., Contr. to Conch, p. 56, 1850.

*M. sagittata*, Reeve, Conch. Icon. Marginella, pl. 15, f. 70, 1865. *Caribbean; Bahamas to Brazil.*

**177. M. Sandwicensis,** Pease, Proc. Lond. Zool. Soc. 1860, p. 147, 1860.

Reeve, Conch. Icon. Marginella, pl. 27, f. 157, 1865.

*Sandwich Islands.*

**178. M. sapotilla,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 74, April, 1844.

Hinds, Moll. Voyage Sulphur, p. 45, pl. 13, f. 10, 11, 1844. Sowb., Thes. Conch. i, 383, pl. 77, f. 150, 151, 1846. C. B. Ad., Ann. N. Y. Lyc. Nat. Hist. v, 264, 1852. C. B. Ad., Panama Shells, p. 40, 1852. Carpenter, Proc. Lond. Zool. Soc. 1863, p. 341, 1863. Reeve, Conch. Icon. Marginella, pl. 11, f. 47 a, b, 1864. Küster, Syst. Conch. Cab. v, part 4, pl. 1*, f. 14, 15, 1865.

*Panama.*

**179. M. sarda,** Kiener, Coq. Viv. p. 30, pl. 4, f. 42, 1834.

Sowb., Thes. Conch. i, 400, pl. 78, f. 167, 168, 1846. Chenu, Manuel de Conch. i, 199, f. 1065, 1859. Reeve, Conch. Icon. Marginella, pl. 18, f. 91 a, b, 1865.

*Ceylon.*

M. Saulcyana, Petit, is *M. Storeria*, Couth.

M. Saulcyana, Reeve, is *M. cincta*, Kiener.

**180. M. Sauliæ,** Sowb., Thes. Conch. i, 386, pl. 75, f. 68, 1846.

Chenu, Manuel de Conch. i, 197, f. 1038, 1859.

*Hab. unknown.*

**181. M. scripta,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 73, April, 1844.

Hinds, Moll. Voyage Sulphur, p. 45, pl. 13, f. 16, 17, 1844. Sowb., Thes. Conch. i, 386, pl. 75, f. 83–85, 1846. Chenu, Manuel de Conch. i, 197, f. 1037, 1859. Reeve, Conch. Icon. Marginella, pl. 14, f. 58, 1865.

*Straits of Macassar*, Hinds; *Madagascar*, Petit.

**182. M. secalina,** (Philippi.)

*Volvaria triticea*, var. b, (syn. excl.) Lam., Anim. sans Vert. vii, 363, 1822.

*Voluta exilis* (not Gmel.), Chiaje, Poli. Test. iii, 30, pl. 46, f. 35, 36, 1826.

*Volvaria triticea*, Payr., Cat. Moll. de Corse, i, 168, 1826. Phil., Moll. Sicil., i, 232, pl. 12, f. 15 (animal), 1836.

*Volvaria secalina*, Phil., Moll. Sicil., ii, 197, pl. 27, f. 19, 1844.

*Volvaria triticea*, var. b (syn. excl.), Desh. ed. Lam., Anim. sans Vert. x, 460, 1844.

*? Marg. triticea*, Sowb., Thes. Conch. i, 388, (pl. 76, f. 119—121)? 1846.

*Volvaria triticea*, Mrs. Gray, Fig. Moll. Anim. ii, pl. 102, f. 4 (*ex Philippi*), 1850. H. and A. Ad., Genera Rec. Moll. i, 194, pl. 20, f. 5 (*ex Philippi*), 1858.

*M. secalina*, Küster, Syst. Conch. Cab. v, part 4, pl. 4*, f. 21–23, 1865.

*M. exilis* (not Gmel.), Hidalgo, Cat. Moll. Mar. de l'Esp. p. 96, 1867.

*M. secalina*, Hidalgo, Cat. Moll. Mar. de l'Esp. p. 96, 1867. Weinkauff, Conch. desMittelmeeres, ii, 22, 1868.

*Mediterranean Sea.**

**183. M. semen,**† Reeve, Conch. Icon. Marginella, pl. 26, f. 145, 1865. *Hab. unknown.*

**184. M. seminula,** Gould, Proc. Bost. Nat. Hist. Soc. vii, 384, Dec. 1860.

Gould, Otia Conchologica, 139, 1862.

*False Bay, C. of Good Hope.*

**185. M. serrata,** Gaskoin, Proc. Lond. Zool. Soc. 1849, p. 19, 1849.

Reeve, Conch. Icon. Marginella, pl. 23, f. 124 a, b, 1865.

*Mauritius*, Gaskoin.

M. SIMILIS, Sowb., is *M. obesa*; Redf.

**186. M. simplex,** Reeve, Conch. Icon. Marginella, pl. 22, f. 115, 1865. *Eastern Australia.*

**187. M. sordida,** Reeve, Conch. Icon. Marginella, pl. 24, f. 137, 1865. *Hab. unknown.*

M. SOWERBIANA, Petit, is *M. monilis*, Sowb. and perhaps of Linn.

M. SPILOTA, Ravenel, of Catalogues, is an unpublished, hence unknown, species.

M. SPLENDENS, Reeve, is *M. Reeveana*, Petit.

**188. M. Storeria,** Couthouy, Boston Journ. Nat. Hist. i, 440, pl. 9, f. 1, 2, 1837.

*? M. cærulescens*, var. Sowb., Thes. Conch. i, pl. 77, f. 155, (*not* 153 and 154), 1846.

*M. Stuleyana*, Petit (not Reeve), Journ. de Conch. ii, 47, pl. 1, f. 11, 1851.

*M. crassilabrum*, Reeve (not Sowb.), Conch. Icon. Marginella, pl. 18, f. 92, 1865. *Coast of Brazil and Caribbean Sea.*

**189. M. striata,**‡ Sowb., Thes. Conch. i, 375, pl. 75, f. 81, 82, 1846.

Reeve, Conch. Icon. pl. 27, f. 155, 1865.

*St. Thomas, W. I.*

* Most of the synonomy of the perplexing *M. triticea* of Lam. becomes clear if we separate the Senegal shell from that of the Mediterranean, referring the former type to *M. exilis*, Gm., and the latter to *M. secalina*, Phil.

† Very near to *M. ovuliformis*, Orb.

‡ Compare with *M. sulcata*, Orb.

**190. M. strigata,** (Dillw.)

*Voluta glabella undulata*, Chemn., Conch. x, 166, pl. 150, f. 1423, 1424, 1788.

*Voluta glabella*, var *θ*, Gmel. ed. Syst. Nat. p. 3444, 1788.

*Voluta glabella*, var. c, Schreibers, i, 115, 1793. Encyl. Meth. Vers. pl. 377, f. 7, 1798.

*? Voluta porcellana*, Perry, Conch. pl. 17, f. 2, 1811.

*Voluta strigata*, Dillw., Descr. Cat. p. 530, 1817. Wood, Index Testac. pl. 20, f. 67, 1828.

*Marg. strigata*, Kiener, Coq. Viv. p. 14, pl. 8, f. 37, 1834.

*Marg. undulata*, Desh. ed. Lam. Anim. sans. Vert. x, 451, 1844.

*Marg. elegans*, var. Sowb., Thes. Conch. i, 385, pl. 77, f. 148, 1846.

*Marg. undulata*, Roberts, Pop. Hist. Moll. pl. 4, f. 4 (*animal*), 1851. Chenu, Manuel de Conch. i, 199, f. 1055, 1859. Reeve, Conch. Icon. Marginella, pl. 2, f. 5, 6 a, b, 1864.

*Marg. Burchardi* (not Dunker), Reeve, Conch. Icon. Marginella, pl. 2, f. 3 a, b (*colorless var.*), 1864.

*Indian Ocean.*

**191. M. suavis,** Souverbie, Journ. de Conch. vii, 376, June, 1859.

Souverbie, Journ. de Conch. viii, 126, pl. 2, f. 13, Jan. 1860. Souverbie, Journ. de Conch. xi, 170, 1863.

*New Caledonia Group, Pacific.*

M. SUBCŒRULEA, Authors, is *M. prunum*, Gmel.

**192. M. subtrigona,** Carpenter, Ann. and Mag. Nat. Hist. xv, 397, May, 1865.

*Monterey to St. Barbara, California.*

**193. M. subtriplicata,** Orb.

*M. triplicata*, Orb., Moll. de Cuba, pl. 20, f. 30–32 (name preoccupied), date ?

*M. subtriplicata*, Orb., Moll. de Cuba, Text. Vol. ii, 99, 1853.

*M. lactea* (not Kiener), Reeve, Conch. Icon. pl. 17, f. 81, and pl. 24, f. 135. *Caribbean; Bahamas to Guadeloupe.*

**194. M. succinea,** Conrad, Proc. Ac. Nat. Sci. Phil. iii, 26, pl. 1, f. 17, 1846. *Tampa Bay, Florida.*

**195. M. sulcata,** Orb., Moll. de Cuba, ii, 102, pl. 21, f. 14–16, 1853. *Martinique*, Candé.

M. SWAINSONIANA, Petit, is *M. phrygia*, Sowb.

**196. M. tæniata,** Sowb., Proc. Lond. Zool. Soc. 1846, p. 96, 1846.

Sowb., Thes. Conch. i, 391, pl. 76, f. 128, 129, 1846. Reeve, Conch. Icon. Marginella, pl. 17, f. 85, 1865.

*West Indies.*

**197. M. tantilla,** (Gould).

*Persicula tantilla*, Gould, Proc. Bost. Nat. Hist. Soc. vii, 384, Dec. 1860. Gould, Otia Conchologica, p. 139, 1862.

*China Sea.*

**198. M. tenera,** (Menke).

*Volvaria tenera*, Menke, Synops. Meth. Moll. p. 88, 1828.

*Porto Rico.*

**199. M. Terveriana,** Petit, Journ. de Conch. ii, 49, pl. 2, f. 2, 1851.

Reeve, Conch. Icon. Marginella, pl. 23, f. 127, 1865.

*I. Socotra*, Petit; *Red Sea*, Reeve.

M. TESSELLATA, Lam. is *M. porcellana*, Dillw.

M. TORNATELLA, Savigny, Moll. de l'Egypt, is a *Tornatella*, or of an allied genus.

**200. M. Traillii,** Reeve, Conch. Icon. Marginella, pl. 21, f. 114, 1865. *Malacca.*

**201. M. translata,** Redf.

*M. pyriformis* (preoccupied) Pease, Am. Journ. Conch. iii, 280, pl. 23, f. 21, Jan., 1868. *Paumotu Group, Pacific.*

**202. M. translucida,** Sowb., Thes. Conch. i, 376, pl. 75, f. 62, 63, 1846. *Eastern Australia.*

**203. M. tribalteata,** Reeve, Conch. Icon. Marginella, pl. 20, f. 102, 1865. *Hab. unknown.*

**204. M. tricincta,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 76, 1844.

Hinds, Moll. Voyage Sulphur, p. 46, pl. 13, f. 12, 13, 1844. Sowb., Thes. Conch. i, 401, pl. 78, f. 181, 182, 1846. Chenu, Manuel de Conch. i, 197, f. 1039, 1859. Reeve, Conch. Icon. Marginella, pl. 12, f. 49, a, b, 1864.

*Straits of Macassar.*

**205. M. triplicata,** Gaskoin, Proc. Lond. Zool. Soc. 1849, p. 19, 1849.

Reeve, Conch. Icon. Marginella, pl. 23, f. 126, 1865.

*M. angystoma*, Gaskoin, ined. *Philippine Islands.*

M. TRIPLICATA, Orb., Plates of Moll. de Cuba is *M. subtriplicata* of Text of same.

M. TRITICEA, Lam., is *M. exilis*, (Gmel.)

M. TRITICEA, Payr., is *M. secalina*, Phil.

**206. M. turbinata,** Sowb., Thes. Conch. i, 385, pl. 75, f. 70, 71, 1846.

*M. albina*, Gaskoin, Ann. Nat. Hist. 2d ser. xi, 358, pl. 12, f. 7, 8, 1853.

*M. turbinata*, Reeve, Conch. Icon. Marginella, pl. 22, f. 122, 1865. *Australia.*

M. UNDULATA, Desh., is *M. strigata*, (Dillw.)

M. VARIA, Sowb., is in part *M. avena*, Val., and in part *M. albolineata*, Orb.

M. VAUTIERI, Bernardi, is *M. imbricata*, Hinds.

**207. M. ventricosa,** (Fischer,) Mus. Demidoff,* 1807.

Petit, Cat. in Journ. de Conch. ii, 53, 1851. *Sumatra.*

M. VERMICULATA, Redf., Cat. of Coll. Marg. is a worn *M. quinqueplicata*, Lam.

**208. M. vexillum,** Redf., Ann. N. Y. Lyc. Nat. Hist. v, 224, 1852.

Reeve, Conch. Icon. Marginella, pl. 19, f. 98, 1865. Redf. Am. Journ. Conch. v, 94, pl. 8, f. 2, 1869.

*C. Palmas, W. Africa.*

**209. M. vitrea,** Hinds, Proc. Lond. Zool. Soc. 1844, p. 75, 1844.

Hinds, Moll. Voyage Sulphur, p. 45, pl. 13, f. 18, 19, 1844. Sowb., Thes. Conch. i, 387, pl. 75, f. 74, 75, 1846. Reeve, Conch. Icon. Marginella, pl. 23, f. 128, 1865. *West Africa.*

M. VITTATA, Reeve, is *M. ornata*, Redf.

**210. M. volutiformis,** Reeve, Conch. Icon. Marginella, pl. 24, f. 131, 1865. *Hab. unknown.*

M. XANTHOSTOMA, Mörch, Cat. Yoldi (1852) is undescribed and hence unrecognizable.

**211. M. zonata,** Kiener.

Schrœter, Einleitung i, 303, No. 231, pl. 1, f. 18, a, b, 1783.

*M. zonata,* Kiener, Coq. Viv. p. 41, pl. 13, f. 4, ?1840. Desh. ed. Lam. Anim. sans Vert. x, 453, 1844. Sowb., Thes. Conch. i, 392, pl. 76, f. 115, 116, 1846. Reeve, Conch. Icon. Marginella, pl. 16, f. 77, a, b, 1865.

*West Indies.*

M. ZONATA var. BILINEATA, Krauss, is var. of *M. Dunkeri*, Krauss.

* As I have had no opportunity of referring to this work, I adopt the species on the authority of Petit's Catalogue. He places it next to *M. quinqueplicata*, whence I infer that it may be one of the forms alluded to in my note upon that species.

B. *Fossil Species.**

1. **M. æstuarina,** Edwards.
*M. pusilla*, (in part) Edwards, Eocene Moll. of G. B. p. 143, pl. 18, f. 6, 1852.
*M. æstuarina*, Edwards, Geolog. Mag. ii, 541, pl. 14, f. 7, a–c, 1865. *Eocene; New Forest, England.*

2. **M. Americana,** Conrad, Foss. of Med. Tertiary, p. 86, pl. 49, f. 12, (no description) 1838.
*Oligocene; Claiborne, Miss.*

3. **M. ampulla,** Desh., Coq. Foss. de Paris ii, 711, pl. 95, f. 17—19, 1824. Desh., ed. Lam. Anim. sans Vert. x, 457, 1844. *Middle Eocene; Valmondais, France.*
M. ANATINA, I. Lea, is *M. crassilabra*, Conrad.

4. **M. angystoma,** Desh., Coq. Foss. de Paris ii, 710, pl. 95, f. 23—25, 1824.
Desh., ed. Lam. Anim. sans Vert. x, 456, 1844.
*Middle Eocene; France.*

5. **M. antiqua,** Redf., Ann. N. Y. Lyc. Nat. Hist. v, 226, June, 1852.
*Porcellana olivæformis*, Tuomey and Holmes, Fossils of S. C. p. 131, pl. 27, f. 12, 13, 1857.
*Marginella olivæformis*, Emmons, Report of Geol. Surv. N. C. 1858, p. 261, f. 133, 1858.
*Porcellana (Volutella) oliviformis*, Conrad, Journ. Ac. Nat. Sci. 1862, p. 564, 1862.
*Miocene and Pliocene; Petersburgh, Va.; N. Carolina. and Sumter and Darlington Distr. S. C.*
M. AURICULATA, Menard, is a *Ringicula.*
M. AURIS-LEPORIS, Defrance, is *Voluta auris leporis*, Brocchi (not Grat.)
M. AVENA, Michelotti, (not Val.) is *M. oblongata*, Bonelli.

6. **M. bella** (Conrad.)
*Porcellana (Porcellanella) bella*, Conrad, Cat. in Proc. A. N. S. Phil. 1862, p. 564, 1862.
*Prunum bella*, (sic) Conrad, Am. Journ. Conch. iv, 67, pl. 6, f. 4, 1868. *Miocene; James R., Va.*

7. **M. bifido-plicata,** Charlesworth, Edwards, Eocene Moll. Gr. Br. p. 139, pl. 18, f. 2, a–g, 1852.
*Eocene; England.*

* I am indebted to T. A. Conrad, Esq., for his aid in perfecting the Catalogue of the American fossil species of this genus.

M. BIPLICATA, Risso, (*Volvaria*) probably belongs to another genus.

M. BIPLICATA, I. Lea, (in Contr. to Geol.) is a *Ringicula.*

M. CANCELLATA, Du Bois, Conch. Foss. 1831, is a *Ringicula.*

M. CLANDESTINA, (Brocchi) see among recent species.

**8. M. columba,** I. Lea, Contr. to Geol. p. 177, pl. 6, f. 187, 1833. *Oligocene ; Claiborne, Ala.*

**9. M. coniformis,** Sowb., Quart. Journ. Geol. Soc. vi, 45, 1850.

Sowb., Quart. Journ. Geol. Soc. xxii, 288, pl. 17, f. 2, 1866. *Miocene ; Cumana, St. Domingo.*

**10. M. constricta,** Conrad, Fossil shells of Tert. Form. U. S. 1st ed. 33, 1832.

Conrad, Fossil shells of Tert. Form. U. S. 2d ed. 46, pl. 16, f. 15, Oct., 1833.

*Erato ? constricta*, Conrad, Am. Journ. Conch. i, 25, 1865. *Oligocene ; Claiborne, Ala.*

M. CONSTRICTA, Emmons, is *M. contracta,* Conrad.

**11. M. contracta,** Conrad. Here proposed for Emmons' name preoccupied.

*M. constricta*, (not Conrad) Emmons, Rep. Geol. Surv. N. C. 1858, p. 261, f. 135, 1858.

*Porcellana (Glabella) constricta*, Conrad, Cat. in Proc. Ac. N. Sc., 1862, p. 564, 1862. *Miocene of North Carolina.*

**12. M. conulus,** H. C. Lea, Trans. Am. Phil. Soc. ix, 273, pl. 37, f. 102, 1845.

*Porcellana (Volutella) conulus*, Conrad, Cat. in Proc. Ac. N. Sc. 1862, p. 563, 1862. *Miocene ; Petersburgh, Va.*

M. COSTATA, Eichwald, is a *Ringicula.*

**13. M. crassilabra,** Conrad, Foss. Shells Tert. Form. U. S. 1st ed. p. 33, pl. 16, f. 8, Aug., 1833.

*M. anatina*, I. Lea, Contr. to Geol. p. 176, pl. 6, f. 186, Nov., 1833.

*M. crassilabra*, Conrad, Foss. Shells Tert. Form. U. S. 2d ed. p. 45, pl. 16, f. 13, 1834.

*Erato crassilabra*, Conrad, Am. Journ. Conch. i, 25, 1865. *Oligocene ; Claiborne, Ala.*

M. CRASSILABRA, I. Lea, is *M. humerosa*, Conrad.

**14. M. Cuvieri,** Desh. Traité Elém. pl. 123, f. 8, ? 1850. *Hab. unknown.*

**15. M. denticulata**, Conrad, Journ. Ac. Nat. Sci. Phil. vi, 225, pl. 9, f. 21, 1830.

Conrad, Foss. Med. Tert. Form. U. S. p. 86 (*not* pl. 49, f. 10),* 1838.

*Porcellana* (*Glabella*) *denticulata*, Conrad, Cat. in Proc. Ac. Nat. Sci. 1862, p. 564, 1862. *Miocene; Maryland.*

**16. M. dentifera**, Lam., Ann. du Mus. ii, 61, 1803.

Roissy, Buffon, Moll. vi, 10, 1805. Lam., Anim. sans Vert. 1st ed. vii, 359, 1822. Defrance, Dict. des Sci. Nat. xxix, 145, 1823. Desh., Coq. Foss. de Paris, ii, 707, pl. 95, f. 27–29, 1824. Desh., Encycl. Meth. Vers. ii, 413, 1830. Desh. ed. Lam. Anim. sans Vert. x, 442, 1844. *Middle Eocene; Paris Basin.*

**17. M. Deshaysii**, Michelotti, Foss. Mioc. de l'Italie Sept. p. 321, pl. 17, f. 16, 1847.

*M. glabella* (not Linn.), Sismonda, Syn. Meth. p. 46, 1847.

*M. Deshaysii*, Desh., Traité Elémentaire, pl. 123, f. 10. ? 1850. *Miocene: Piedmont.*

M. DISTANS, Conrad, in Cat. Proc. A. N. S. 1862, p. 563, is undescribed and unidentified.

**18. M. eburnea**, Lam., Ann. du Mus. ii, 61, 1803.

Lam., Ann. du Mus. vi, pl. 44, f. 9, 1805. Roissy, Buffon Moll. vi, 9, 1805. Lam. Anim. sans Vert. 1st ed. vii, 359, 1822. Defrance, Dict. des Sci. Nat. xxix, 145, 1823. Brongn., Foss. Terr. Tert. Vicentin, pl. 44, f. 9, 1823. Desh., Coq. Foss. de Paris, ii, 707, pl. 95, f. 14—16, and 20—22, 1824.

*M. hordeola*, Desh., Coq. Foss. de Paris, ii, 708, pl. 95, f. 26—29, 1824.

*M. eburnea*, Desh., Encycl. Meth. Vers. ii, 413, 1830. Desh. ed. Lam. sans Vert. x, 441, 1844.

*M. hordeola*, Desh. ed. Lam. sans Vert. x, 455, 1844.

*M. eburnea*, Edwards, Eocene Moll. Gr. Brit. p. 137, pl. 18, f. 1 a, b, c, 1852. *Eocene; England and France.*

M. EBURNEA, Grat., is *M. subeburnea*, Orb.

M. EBURNEA, Beyrich, is *M. intumescens*, Kœnen.

**19. M. eburneola**, Conrad, Journ. Ac. Nat. Sci. Phil. vii, 141, 1834.

Conrad, Foss. Med. Tert. U. S. p. 86 (*not* pl. 49, f. 11),† 1838.

* The reference to this figure in Conrad's text is evidently wrong.

† Wrong reference in Conrad's text.

*Porcellana* (*Glabella*) *eburneola*, Con., Cat. in Proc. Ac. N. S. Phil. 1862, p. 564, 1862.

*Prunum eburneola*, Con., Am. Journ. Conch. iv, 67, pl. 5, f. 1, 1868. *Miocene; Suffolk, Va.*

**20. M. elevata,** Emmons, Report Geol. Surv. N. C. 1858, p. 138, 1858. *Miocene; N. Carolina.*

**21. M. elongata,** Bellardi and Mich. Mem. Real. Ac. Sci. Torino, iii, 155, pl. 5, f. 10, 11, 1841.

Bellardi, Sag. orit. p. 63, pl. 3, f. 10, 11. Sismonda, Syn. Meth. Anim. Invert. Foss. p. 46, 1842. Michelotti, Foss. Terr. Mioc. de l'Ital. Sept. p. 323, 1847.

*Miocene; Piedmont.*

**22. M. emarginata,** Bonelli, ined., Sismonda, Syn. Meth. An. Invert. Foss. p. 46, 1842.

Michelotti, Foss. Terr. Mioc. de l'It. Sept. p. 321, 1847.

*Upper Miocene; Piedmont.*

M. EXILIS, H. C. Lea (preoccupied), is *M. subexilis*, Orb.

M. GLABELLA, (Linn.) See among recent species.

M. GRACILIS, Edwards (preoccupied), is *M. subgracilis*, Redf.

M. HORDEOLA, Desh., is var. of *M. eburnea*, Lam.

**23. M. humerosa,** Conrad.

*M. crassilabra*,* I. Lea (not Conrad), Contr. to Geol. p. 177, pl. 6, f. 188, Nov. 1833.

*M. humerosa*, Conrad, Foss. Shells Tert. U. S. 2d ed. p. 45, pl. 16, f. 14, 1834. Conrad, Cat. in Appendix Morton's Syn. p. 5, 1834.

*Erato humerosa*, Conrad, Am. Journ. Conch. i, 25, 1865.

*Oligocene; Claiborne, Ala.*

**24. M. incurva,** I. Lea, Contr. to Geol. p. 179, pl. 6, f. 192, 1833. *Eocene; Claiborne, Ala.*

M. INFLEXA, Emmons (preoccupied), is *M. subinflexa*, Redf.

**25. M. intumescens,** Kœnen.

*M. eburnea*, Beyrich (not Lam.) Conch. Nord-Deutsch Tert. p. 52, pl. 2, f. 9 a, b, 1853.

*M. intumescens*, Kœnen, Zeitsch. Deutsch. Geol. Gesellsch. 1865, p. 505, 1865.

*Lower Oligocene; Brunswick, Prussia.*

M. INVOLUTA, Zekeli (a cretaceous species), is probably an *Ovula*. See Pictet Pal. Suisse, 3d ser. p. 687.

* Preoccupied by *M. crassilabra*, Conrad.

**26. M. larvata,** Conrad, Fossil Shells Tert. Form. U. S. 1st ed. p. 33, pl. 16, f. 7, Aug. 1833.

*M. ovata*, Lea, Contrib. to Geol. p. 179, pl. 6, f. 191, Nov. 1833.

*M. semen* (young), Lea, Contrib. to Geol. p. 179, pl. 6, f. 190, Nov. 1833.

*M. larvata*, Conrad, Fossil Shells, Tert. Form. U. S. 2d ed. p. 45, pl. 16, f. 12, 1834.

*Volutella larvata*, Conrad, Am. Journ. Conch. i, 25, 1865.

*Oligocene; Claiborne, Ala.*

**27. M. limatula,** Conrad.

*Porcellana limatula*, Conrad, Journ. Ac. Nat. Sci. vii, 140, 1834.

*Marg. limatula*, Conrad, Fossils Med. Tert. U. S. p. 86, pl. 49, f. 11,* 1838.

*Porcellana limatula*, Tuomey and Holmes, Pleiocene Foss. S. C. p. 130, pl. 27, f. 10, 11, 1857.

*Marg. limatula*, Emmons, Rep. Geol. Surv. N. C. 1858, p. 261, f. 134, 1858.

*Porcellana limatula*, Tuomey and Holmes, Post Pleiocene Foss. S. C. p. 78, pl. 12, f. 12, 1860.

*Porcellana (Glabella) limatula*, Conrad, Cat. in Proc. Ac. Nat. Sci. 1862, p. 564, 1862.

*Prunum limatula*, Conrad, Am. Journ. Conch. iv, 67, pl. 6, f. 5, 1868.

*Miocene; N. Carolina and S. Carolina. Post Pleiocene of S. Carolina.*†

M. MILIARIA, (Linn.) See among recent species.

M. MILIACEA, Dujardin (not Lam.), is *M. submiliacea*, Orb.

M. MINUTA, Pf. See among recent species.

M. MONILIS, (Linn.) See among recent species.

M. NANA, Conrad, Cat. in Append. Morton's Synops. is undescribed and unidentified.

**28. M. nitidula,** Desh., Coq. Foss. de Paris, ii, 709, pl. 95, f. 10, 11, 1824.

Desh. ed. Lam. Anim. sans Vert. x, 456, 1844. Desh. Traité Elémentaire, pl. 123, f. 13, ?1850. Beyrich, Conch. Nord-Deutsch Tert. Geb. p. 54, pl. 2, f. 11 a, b, 1853. *Middle Eocene; Paris Basin.*

* The text refers to fig. 9, but fig. 11 is evidently the one intended for *M. limatula.*

† There is much variation between the earlier and later deposits in the size and development of the shell, and it must be confessed that it closely approaches some of the forms now existing. Compare with *M. roscida*, Redf., and the more robust varieties of *M. apicina*, Menke.

**29. M. oblongata,** Bonelli, ined., Sism. Mem. Acad. Torin, v, 450, 1843.

*M. avena* (not Val.), Michelotti, Foss. Terr. Mioc. de l'Ital. Sept. p. 323, 1847. *Upper Miocene; Piedmont.*

M. OLIVÆFORMIS (Tuomey and Holmes), is *M. antiqua*, Redf.

M. OVATA, I. Lea, is *M. larvata*, Conrad.

**30. M. ovata,** Emmons, Rep. Geol. Surv. N. C. p. 261, f. 136, 1858.

*Porcellana* (*Glabella*) *ovata*, Conrad, Cat. Proc. Ac. Nat. Sc. Phil. 1862, p. 564, 1862. *Miocene; N. Carolina.*

**31. M. oviformis,** Conrad, Foss. Med. Tert. U. S. (not described, but figured), pl. 49, f. 9,* 1838.

*Volutella* (*Microspira*) *oviformis*, Conrad, Am. Journ. Conch. iv, 66, pl. 5, f. 3, 1868. *Miocene; Virginia.*

**32. M. ovulata,** Lam.

Encyc. Meth. Vers. pl. 376, f. a, b, 1798. Lam., Ann. du Mus. ii, 61, 1803. Lam., Ann. du Mus. vi, pl. 44, f. 10, 1805. Roissy, Buffon Moll. vi, 10, No. 6, 1805. Lam., Anim. sans Vert. 1st ed. vii, 359, 1822. Defrance, Dict. des Sci. Nat. xxix, 145, 1823. Desh., Coq. Foss. de Paris, ii, 709, pl. 95, f. 12, 13, 1824. Desh., Encyc. Meth. Vers. ii, 416, 1830. Desh. ed. Lam. Anim. sans Vert. x, 442, 1844. Bronn, Lethæa Geogn. 3d ed. iii, 570, pl. 42, f. 44, 1852. Edwards, Eocene Moll. Gr. Brit. p. 141, f. 5 a—c, 1852. *Eocene; England, France.*

M. OVULATA, Grat. (not Lam.), is *M. subovulata*, Orb.

M. OVULATA, Beyrich (not Lam.), is *M. perovalis*, Kœnen.

**33. M. perexigua,** Conrad, Journ. Acad. Nat. Sci. Phil. viii, 189, 1842. *Miocene; Maryland.*

**34. M. perovalis,** Kœnen.

*M. ovulata*, Beyrich (not Lam.), Conch. Nord Deutsch, Tert. p. 49, pl. 2, f. 10 a, b, 1853.

*M. perovalis*, Kœnen, Zeitsch. Deutsch. Geol. Gesell. p. 506, 1865. *Lower Oligocene; Prussia.*

**35. M. phaseolus,** Brongn., Foss. Terr. Tert. Vicentin, p. 64, pl. 2, f. 21, 1823.

Bronn., It. Tert. Gebilde, p. 18, No. 54, 1831. *Middle Eocene; France and Italy.*

* This figure is by an error of the text referred to *M. limatula.*

**36. M. pinea,** Bronn, (*Volvaria*) Italiens Tertiargebilde, ii, 17, No. 48, 1831. *Upper Miocene; Italy.*

**37. M. planulosa,** Bonelli, ined.
Sismonda, Synops. Meth. Foss. p. 46, 1847. Orbigny, Prodromus iii, 31, No. 830, 1852. *Miocene; Piedmont.*

**38. M. plicata,** I. Lea, Contr. to Geol. p. 178, pl. 6, f. 189, 1833. *Oligocene; Claiborne, Ala.*

**39. M. pusilla,** Edwards, Eocene Mollusca Gr. Br. p. 143, pl. 18, f. 6, a–c, (in part) 1852. *Eocene; Great Britain.*
M. SECALINA, Phil. See among recent species.
M. SEMEN, I. Lea, is young of *M. larvata*, Conrad.

**40. M. simplex,** Edwards, Eocene Moll. Gr. Brit. p. 143, pl. 18, f. 8, a–c, 1852. *Eocene; Great Britain.*

**41. M. splendens,** Grat., Actes. Soc. Lin. Bord. vi, p. 301, No. 572, 1833.
Grat., Atlas. Conch. Foss. Adour. i, pl. 42, f. 36, 37, 1845. Orb., Prodromus iii. 9, No. 134, 1852.
*Miocene; Adour, France.*

**42. M. subeburnea,** Orb.
*M. eburnea*, Grat., (not Lam.) Actes, Soc. Lin. Bord. vi, p. 301, No. 573, 1833. Grat., Atlas, Conch. Foss. Adour. i, pl. 42, f. 38—40, 1845.
*M. subeburnea*, Orb., Prodromus iii, 9, No. 135, 1852.
*Miocene; France.*

**43. M. subgracilis,** Redf. Here proposed for *M. gracilis*, Edw.; preoccupied.
*M. gracilis*, Edwards, (not C. B. Ad.) Eocene Moll. Gr. Br. p. 140, pl. 18, f. 4, a–c, 1852. *Eocene; Great Britain.*

**44. M. subinflexa,** Redf. Here proposed for *M. inflexa*, Emmons; preoccupied.
*M. inflexa*, Emmons, (not Sowb.) Rep. Geol. Surv. N. C. 1858, p. 261, f. 137, 1858. *Miocene; N. Carolina.*

**45. M. submiliacea,** Orb.
*M. miliacea*, Dujardin, (not Lam.) Mem. Soc. Geol. 1837, pl. 19, f. 18, 1837.
*M. submiliacea*, Orb., Prodromus iii, 51, No. 844, 1852.
*Miocene; Tours, France.*

**46. M. subovulata,** Orb.
*M. ovulata*, Grat., (not Lam.) Actes. Soc. Lin. Bord. vi, 301, No. 573, 1833. Grat., (not Lam.) Atlas. Conch. Foss.

Adour. pl. 42, f. 35, 1845. Michelotti, (not Lam.) Foss. Terr. Mioc. p. 323, 1847. Sismonda, (not Lam.) Synops. Meth. i, 46, 2d ed. 1847.

*M. subovulata*, Orb., Prodromus iii, 51, No. 845, 1852.

*Miocene : France and Piedmont.*

**47. M. Taurinensis,** Michelotti.

*M. eburnea*, Bonelli, ined. (not Lam.) Bronn, Ital. Tertiargebilde, p. 18, No. 53, 1831. Sismonda, Syn. Meth. Inv. Foss. p. 42, No. 3, 1847.

*M. Taurinensis*, Michelotti, Foss. Ter. Mioc. p. 322, 1847. Orb., Prodromus iii, 51, No. 851, 1852.

*Miocene : Piedmont.*

**48. M. Virginiana** (Conrad).

*Prunum Virginiana*, Conrad, Am. Journ. Conch. iv, 67, pl. 5, f. 4, Oct., 1868. *Miocene ; James R., Va.*

**49. M. vittata,** Edwards, Eocene Moll. Gr. Br. p. 143, pl. 18, f. 7, a–c, 1852. *Eocene ; Great Britain.*

## Genus **VOLVARIA,** Lam.*

Syst. Anim. p. 93, 1801.

*Volvaria*, Lam., (in part) Syst. Anim. vii, 362, 1822.

*Fossil Species only.*

**1. V. acutiuscula,** Sowb., Genera of Shells, Volvaria, f. 3, 1824.

Desh., Coq. de Paris ii, 712, pl. 95, f. 7—9, 1824. Jas. Sowb., Mineral Conch. G. B. pl. 487, 1825. Desh., ed. Lam. Anim. sans Vert. x, 462, 1844.

*Lower and Middle Eocene : London Clay and Paris Basin.*

**2. V. bulloides,** Lam.

Encyc., Meth. Vers. pl. 384, f. 4, a, b, 1791.

*Volvaria bulloides*, Lam., Ann. du Mus. v, 29, 1804. Roissy, Buffon, Moll. v, 329, pl. 55, f. 2, 1805. Lam., Anim. sans Vert. 1st ed. vii, 364, 1822. Desh., Coq. de Paris ii, 712, pl. 95, f. 4, 5, 6, 1824. Sowb., Genera, Volvaria f. 1, 1824.

* This genus was established by Lamarck for *V. bulloides*, and if restricted to the well marked group of which that is a type, may well be retained. But as he afterwards employed it, in Anim. sans Vert., it embraced a large number of species, which most writers, since his day have referred to *Marginella*.

*Volvaria concinna*, Sowb., Genera, Volvaria f. 2, 1824.

*Voluta pallida*, Wood, (not Lam.) Index Testac. pl. 19, f. 59, 1828.

*Volvaria bulloides*, Desh., Encyc. Meth. Vers. iii, 1830. Desh., ed. Lam. Anim. sans Vert. x, 461, 1844. Chenu, Lecons. Elément. p. 217, f. 721, 1847. Desh., Traité Elément. pl. 123, f. 6, 7, ?1852. Bronn, Lethæa Geogn. 3d ed. iii, 459, pl. 42, f. 9, 1852. Chenu, Manuel de Conch. i, 200, f. 1072, 1859.

*Middle Eocene ; France and Belgium.*

V. CONCINNA, Sowb., is var. of *V. bulloides*, Lam.

**3. V. cretacea,*** Binkhorst, Monog. Gast. de la Craie Sup. de Limbourg, p. 74, pl. 5, a, 3, f. 3, a, b, ?

*Cretaceous ; Limbourg.*

V. GALBA, Conrad, Tert. Foss. 1833, is a *Cylichna*.

V. PINEA, Bronn, is *Marginella pinea*.

V. TENUIS, Reuss, is a *Cylichna*.

* I have not seen this description and figure. If the species be a true Volvaria it is the only one of the family found so low as the Cretaceous.

# CATALOGUE

OF THE

# RECENT SPECIES

OF THE

# FAMILY MELANIDÆ.*

BY A BROT, M. D.

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Family **MELANIDÆ,** D'Orbigny, (partim).
Moll. Canar., 1837.

Genus **MELANIA**, Lamarck, (partim).
Prodr. 1792. Syst. An. s. V. 1801.

§ 1.

(*Melanella*, Swainson, 1840.

1. **M. Holandri,** Ferussac, C. Pfeiff iii, t. 8, f. 6—8, 1828. Pot. Mich. Gal. t. 27, f. 13, 14, 1838. Rossmässler Icon. f. 664, 666, 1839.
   *Melanella Holandri*, (Fer.) H. and A. Ad., Gen. of Rec. Moll. 1858.
   *Melania agnata*, Ziegl., MSS. in Pot. Mich. Gal. t. 27, f. 3, 4, 1838.
   *M. afra*, Ziegl., MSS. Rossm. Icon. f. 665, 1839. Reeve, Conch. Icon. f. 234, 1860.
   *Melanella afra*, (Ziegl.) H. and A. Ad., Gen. of Rec. Moll., 1858.

* I have excluded the United States species which were embraced in the two editions of my "Synopsis," because they have been ascertained to belong to another family, Strepomatidæ.

*Melania cornea*, Küst., MSS. in Reeve, Conch. Icon. f. 233, 1860.
*M. macilenta*, Parreyss., MSS.
*M. nodosa*, Stentz, MSS.
*M. coronata*, Küst., MSS. } fide Parreyss.
*M. atra*, Schmidt, MSS.
*M. cuspidata*, Parreyss, MSS.
*M. Holandri* var: *elegans* et *costulata*, Schmidt, Syst. Verzeichn. Prov. Krain, 1847. *Dalmatia, South Austria.*

2. **M. parvula**, Schmidt, (ubi ?).
*M. Holandri*, var. Rossm. Icon. f. 667, 1839.
*Carniola.*

3. **M. glans**, von dem Busch. Phil. Abbildg. t. 1, f. 8, 9, 1842. Petit., Journ. Conch. 1853, t. 8, f. 6. Reeve, Conch. Icon. f. 232, 1860.
*Paludomus glans*, Auct. Nonnull. in Journ. Conch. 1856, p. 42.
*Melanella glans*, (v. d. B.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch, f. 1948, 1859.
*Hemisinus glans*, (v. d. B.) Brot. Mater. i, p. 62, 1862.
*Melania siccata*, von dem Busch. Phil. Abbildg. t. 2, f. 9, 1843. Reeve, Conch. Icon. f. 230, 1860.
*Melanella siccata*, (v. d. B.) H. and A. Ad., Gen. of Rec. Moll, 1858. *Java.*

4. (?) **M. inermis**, Lesson, (non. Gray, nec. Sow.), Voy. Coquille ii, p. 359, 1829. *New Guinea.*

5. **M. retusa**, Gray, (non. Rafin.), Griff. Cuv. t. 14, f. 9, 1824—33.

6. **M. zonata**, Benson, Journ. Asiat. Soc. 1836, v, p. 747. Reeve, Conch. Icon. f. 217, 1860.
*M. zonata*, von dem Busch, Phil. Abbildg. t. 1, f. 12, 1842.
*Melanella zonata*, (v. d. B.), H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1949, 1859.
*Bengal.*

§ 2.

(*Acrostoma*, Brot.)

7. **M. Hügelii**, Philippi, Abbildg. t. 2, f. 8, 1843. Hanley, Conch. Misc. f. 43, 1854.
*M. breviformis*, Parreyss, MSS.
*Hemisinus Hügelii*, (Phil.), H. and A. Ad., Gen. of Rec. Moll. 1858. Brot. Mater. i, p. 62, 1862.
*New Holland* (?), *South India*, (Blanford.)

**8. M. siphonata,** Reeve, Conch. Icon. f. 143, 1860.
*Hemisinus Hügelii*, (Phil.) Var. Brot. Mater. i, p. 62, 1862.

§ 3.

(*Pachychilus*, Lea, 1850.)

**9. M. apis,** Lea, Proc. Z. S. London, 1850.
Reeve, Conch. Icon. f. 266, 1860.
*Elimia apis*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Vera Cruz.*

**10. M. cinerea,** Morelet, Test. Noviss. Cuba. i, 1849.
Reeve, Conch. Icon. f. 235, 1860.
*Melania graphium*, (Mor.) Reeve, Conch. Icon. f. 150, 1860, (non Morelet). *Coban*, (*Centr. Amer.*)

**11. M. conica,** D'Orbigny, Hist. Nat. Cuba p. 154, t. 10, f. 20, 1845.
*M. nigrata*, Poey, Memor. ii, p. 33, 1857.
*M. nigrita*, (Poey) Reeve, Conch. Icon. f. 90, 1859, f. 362, 1860.
*M. gemella*, Reeve, Conch. Icon, f. 91, 1859.
*M. attenuata*, Anthony, MSS., Reeve, Conch. Icon. f. 438, 1861. *Cuba.*

**12. M. corvina,** Morelet, Test. Nov. Cuba i, 1849.
Hanley, Conch. Misc. t. 2, f. 16; t. 3, f. 25, 1854. Reeve, Conch. Icon. f. 135, 1860.
*Pachychilus corvinus*, (Morelet) H. and A. Ad., Gen. of Rec. Moll. 1858.
Chenu, Man. Conch. f. 1961, 1859, (errore typogr. nom. *M. elevata.*) Vera Paz.

**13. M. exigua,** Morelet, Test. Nov. Cuba i, 1851.
Reeve, Conch. Icon. f. 460, 1861.
*M. minuta*, Brot, Mater. i, p. 43, 1862.
*Peten.*, (*Centr. Amer.*)

**14. M. foeda,** Lea, Proc. Zool. S. Lond. 1850. *Java.*

**15. M. Gassiesii,** Reeve, Conch. Icon. f. 236, 1860.
*M. Sallei*, Gassies, (ubi ?) *Centr. Amer.*

**16. M. glaphyra,** Morelet, Test. Nov. Cuba i, 1849.
Hanly, Conch, Misc. t. 2, f. 17, 1854. Reeve, Conch. Icon. f. 8, 1859.
*Melanoides glaphyra*, (Morelet) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania lacustris*, (Morelet) Reeve, Conch. Icon. f. 5, 1859. (non Morelet). *Centr. Amer.*

**17. M. Godmanni,** Tristram.
*Melanoides Godmanni*, Tristr., Proc. Z. S, Lond. 1863.
*Lake Peten, Vera Paz.*

**18. M. gracilis,** Tristram.
*Pachychilus gracilis*, Tristr., Proc. Z. S. Lond. 1863.
*Lake Peten, Vera Paz.*

**19. M. graphium,** Morelet, Test. Nov. Cuba i, 1849.
Hanley, Conch. Misc. f. 35, 1854.
*Pachychilus graphium*, (Morelet) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Pachychilus Cumingii*, Lea, Ann. Mag. N. H. 1852. Pettit, Journ. Conch. 1853, p. 160. Reeve, Conch. Icon. f. 149, 1860.
*Melania renovata*, Brot, Mater. i, p. 43, 1862.
*Vera Paz, Coban.*

**20. M. Grüneri,** Jonas, Zeitsch. Mal. 1844, p. 48.
Philippi, Abbildg. t. 4, f. 2, 1847.
*Varinas, (Venezuela.)*

**21. M. Guineensis,** Reeve, Conch. Icon. f. 142, 1860.
*Guinea.*

**22. M. Hellerii,** Parreyss, MSS.
*Melania laevissima*, (Sow.) var. Brot Mater. i, p. 42, 1862.
*Centr. Amer.*

**23. M. immanis,** Morelet, Test. Nov. Cuba, ii, 1851.
Reev., Conch. Icon. f. 238, 1860.
*M. polygonata*, Lea, Proc. Z. S. Lond. 1850. Reeve, Conch. Icon. f. 11, 1859.
*Melanoides polygonata*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. *Peten, Coban. (Amer. Centr.)*

**24. M. lacunata,** Reeve, Conch. Icon. f. 136, 1860.
*Centr. Amer.?*

**25. M. lacustris,** Morelet, Test. Nov. Cuba i, 1849.
Hanley, Conch. Misc. f. 26, 1854, (non Reeve, Conch. Icon.)
*Melanoides lacustris*, (Morelet) H. and A. Ad., Gen. of Rec. Moll. 1858. *Lake Yzabal, (Guatemala).*

**26. M. laevissima,** Sowerby, Zool. Journ. i, t. 5, f. 5, 1825.
Desh., in Lam. An. s. V. No. 32, 1838. Hanley, Conch. Misc. f. 23, 1854. Reeve, Conch. Icon. f. 126, 1860.
*Pachychilus laevissimus*, (Sow.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1964, 1859.
*Melania clava*, Menke, MSS. (Mus. Menk.)

· *M. Indorum*, Morelet, Test. Nov. Cuba i, 1849. Petit, Journ. Conch. 1853, t. 5, f. 7. Hanley, Conch. Misc. f. 24, 1854.

*Pachychilus Indorum*, (Morelet) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1963, 1859.

*Melania Sallei*, Reeve, Conch. Icon. f. 133, 1860.

*M. inguinata*, Jan., MSS. Catal. Coll. Cristof. Jan.

*Venezuela*, *Mexico*, *Centr. Amer.*

**27. M. Largillierti,** Philippi, Abbildg. t. 2, f. 10, 1843. ? Reeve, Conch. Icon. f. 127, 1860.

*Melanoides Largillierti*, (Phil.) H. and A. Ad., Gen. of Rec. Moll. 1858.

*Melania rusticula*, von dem Busch., Mal. Blätt. 1858, p. 36.

*M. intermedia*, von dem Busch., Phil. Abbildg. t. 3, f. 4, 1844. Reeve, Conch. Icon. f. 141, 1860.

*Centr. Amer.*

**28. M. Liebmanni,** Philippi, Abbildg. t. 5, f. 8, 1848. Reev., Conch. Icon. f. 139, 1860.

*Melania Liebmanni*, (Phil.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Mexico.*

**29. M. lumbricus,** Reeve, Conch. Icon. f, 145, 1860.

**30. M. maxima,** Lea, Proc. Z. S. Lond. 1850. *Cuban.*

**31. M. meretrix,** Reeve, Conch. Icon. f. 152, 1860.

*Taïti. (?)*

**32. M. mexicana,** Reeve, Conch. Icon. f. 129, 1860.

*M. Oerstedtii*, Mörch, Zeitsch. Mal. 1860, p. 79.

*Centr. Amer.*, *Mexico.*

**33. M. murrea,** Reeve, Conch. Icon. f. 138, 1860.

*Centr. Amer.*

**34. ? M. nassa,** Woodward.

*Melaniella nassa*, Woodw., Proc. Zool. S. Lond. 1859, t. 47, f. 4.

*Melania nassa*, Woodw., Reeve, Conch. Icon. f. 216, 1860.

*Lake Tanganyika*, (*Centr. Africa.*)

**35. M. nucula,** Reeve, Conch. Icon. f. 210, 1860.

*New Caledon.*

**36. M. opiparis,** Morelet, Test. Nov. Cuba i, 1851. Reeve, Conch. Icon. f. 241, 1860. *Dolores*, (*Peten*).

**37. M. pallens,** Reeve, Conch. Icon. f. 153, 1860.

*West Africa.*

**38. M. panucula,** Morelet, Test. Nov. Cuba ii, 1851. Reeve, Conch. Icon. f. 131, 1860. *Peten.*

**39. ? M. parva,** Lea, (an Paludomus, sp. ?)
*Pachychilus parvum*, Lea, Proc. Ac. N. S. Phil. 1856. Journ. Ac. N. S. Phil. vi, 1866. Lea, Obs. Gen. Unio xi, t. 22, f. 14, 1866.
*Melania crassilabrum*, Reeve, Conch. Icon. f. 221, 1860.
*Paludomus cyanostomus*, Morelet, Journ. Conch. 1864.
*Siam, New. Caled.* (?)

**40. M. Planensis,** Lea, Proc. Ac. N. S. Phil. 1858.
Journ. Ac. N. S. Phil. vi, n. s., 1866. Lea, Obs. G. Unio xi, t. 22, f. 26, 1866. *Honduras.*

**41. M. pluristriata,** Say, Desc. New Shells N. America, 1829–31. *Mexico.*

**42. M. porracea,** Reeve, Conch. Icon. f. 218, 1860.

**43. M. pyramidalis,** Morelet, Test. Nov. Cuba i, 1849.
Hanley, Conch. Misc. f. 31, 1854. Reeve, Conch. Icon. f. 25, 1859.
*Melanoides pyramidalis*, (Morelet) H. and A. Ad., Gen. of Rec. Moll. 1858. *Tabasco.*

**44. M. rubicunda,** Reeve, Conch. Icon. f. 206, 1860.

**45. M. Salvini,** Tristram.
*Melanoides Salvini*, Tristr., Proc. Z. S. Lond. 1863.
*Rio de la Paçion, Vera Paz.*

**46. M. Saussurei,** Brot, Rev. Zool. 1860, t. 17, f. 11.
*Mexico.*

**47. M. Schiedeana,** Philippi, Abbildg. t. 2, f. 11, 1843.
Reeve, Conch. Icon. f. 101, 1859; 294, 1860.
*M. variegata*, Wiegmann, MSS. Mus. Reg. Berol.
*Juga Schiedeana*, (Phil.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Mexico.*

**48. M. subnodosa,** Philippi, Abbildg. t. 4, f. 18, 1847.
*Melanoides subnodosa*, (Phil.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Centr. America.*

**49. M. testudinaria,** von dem Busch. Phil. Abbildg. t. 1, f. 14, 1842.
Mousson, Moll. Java t. 11, f. 1–3, 1849. Reeve, Conch. Icon, f. 154, 1860.
*Pachychilus testudinarius*, (v. d. B.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Java.*

**50. M. tumida,** Tristram,
*Melanoides tumida*, Tristr., Proc. Z. S. Lond. 1863.
*Lake Peten, Ver Paz.*

**51. M. Turati,** Villa., Giorn. Mal. 1854, 8, p. 113.
Villa Notiz. int. Gen. Melan. 1855. Brot, Mater. ii, t. 3, f. 11, 1868.
*Luigiana*, (Villa); *Mexico*, (Wessel); *Vera Cruz*, (Beadle).

**52. M. Verreauxiana,** Lea, Obs. Gen. Unio xi, t. 22, f. 27, 1866.
Journ. Ac. N. S. Phil. vi, n. s., 1866.
*M. Verreauiana*, Lea, Proc. Ac. N. S. Phil. 1856.
*Sandwich Isl.* (?)

**53. M. brevis,** D'Orbigny, Hist. Nat. Cuba p. 153, t. 10, f. 15, 1845.
*Paludomus brevis*, Auct. Nonnull.
*Melania zebra*, Brot, Mater. i, p. 43, 1862. *Cuba.*

§ 4.

(*Sulcospira*, Troschel, 1857.

**54. M. ambidextra,** Martens, Mal. Blätt. 1860, p. 46.
(An. = *M. Japonica*, Reeve. ?) *Japan.*

**55. M. ferruginea,** Lea, Proc. Z. S. Lond. 1850.
Reeve, Conch. Icon. f. 147, 1860.
*Pachychilus ferrugineus*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. (an Paludina, sp. ?) *Zanzibar.*

**56. M. Japonica,** Reeve, Conch. Icon. f. 125, 1859.
*M. tenuisulcata*, Dunker, Moll. Jap. t. 2, f. 13, 1861.
*Formosa, Japan.*

**57. (?) M. humerosa,** Gould, Proc. Bost. S. N. H. 1847.
*Burmah.*

**58. M. Sinensis,** Reeve, Conch. Icon. f. 70, 1859. *China.*

**59. M. spadicea,** Reeve, Conch. Icon. f. 132, 1860.

**60. M. sulcospira,** Mousson, Moll. Java t. 9, f. 3, 1849.
*Sulcospira typica*, Troschel, Geb. der Schnecken, 1857.
*Java.*

**61. M. turgidula,** Philippi, Abbildg. t. 4, f. 9, 1847.
*Tarebia turgidula*, (Phil.) H. and A. Ad., Gen. of Rec. Moll. 1858. *China? Manilla?*

§ 5.

(*Nigritella*, Brot.)

**62. M. conulus,** Lea, Proc. Z. S. Lond. 1850.
*Fernando Po*, (*West Africa.*)

**63. M. dimorpha,** Brot, Rev. Zool. 1860, t. 16, f. 6.
*Gabon.*

**64. M. decollata,** Lamarck, (non Philippi) An. s. V. No. 9, 1822.
Delessert, Rec. Coq. t. 30, f. 14, 1841. Chenu, Ill. Conch. t. 2, f. 25. Pot. Mich. Gal. t. 27, f. 7, 8, 1838. ? Reeve, Conch. Icon. f. 78, 1859.
*M. erosa*, (Lesson) Phil. Abbildg. t. 2, f. 7, 1843, (an Lesson ?) Hanley, Conch. Misc. f. 36, 1854.
*M. sculptilis*, Reeve, Conch. Icon. f. 151, 1860.
*Guyana*, (Lam.); *Nossi Bé*, (Morelet).

**65. M. erosa,** Lesson, Voy. Coquille ii, p. 357, 1829.
(= *M. decollata*, Lam. ?) *New Guinea.*

**66. M. Frethii,** Gray, Griff. Cuv. 1834.
Hanley, Conch. Misc. f. 22, 1854.

**67. M. Inhambanica,** Martens, Malac. Blätt. vi, t. 2, f. 10, 1860. *Mozambique.*

**68. M. Mörchii,** Beck, MSS., Reeve, Conch. Icon. f. 108, 1859.

**69. M. nigritina,** Morelet, Rev. Zool. 1848, p. 355.
Morelet, Sér. Conch. i, t. 3, f. 8, 1858.
*M. nigrita*, Morelet, Journ. Conch. 1851, t. 5, f. 2.
*Pachychilus nigritus*, (Morelet) H. and A. Ad., Gen. of Rec. Moll. 1838.
*M. foenaria*, Reeve, Conch. Icon. f. 134, 1860. *Gabon.*

§ 6.

(*Melanoides*, (Olivier) H. and A. Ad., pars 1807.)

**70. M. asperata,** Lamarck, An. s. V. No. 1, 1822.
Delessert, Rec. Coq. t. 30, f. 8, 1841. Chenu, Ill. Conch. t. 2, f. 12. Chenu, Man. Conch. f. 1955, 1859.
*Melanoides aspera*, (Lam.) H. and A. Ad., Gen of Rec. Moll. 1858.
*Melania pagodulus*, Reeve, Conch. Icon. f. 72, 1859.

Var. A.

*Melania asperata*, (Lam.) Reeve, Conch. Icon. f. 2, a–d, 1859.
*M. pulchra*, von dem Busch., Phil. Abbildg. t. 5, f. 1, 1848. Reeve, Conch. Icon. f. 19, 1859.
*Melanoides pulcher*, (v. d. B.) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Pachychilus pulcher*, (v. d. B.) Troschel, Geb. der Schneck. 1857.

Var. B.

*Melania inquinata*, (Defrance), Deshayes., Mag. Conch. t. 13, 1830, (exclus. fossil.)

Deshayes in Lam., An. s. V. No. 28, 1838. (exclus. fossil.) Philippi, Abbildg. t. 2, f. 5, 6, 1843. Reeve, Conch. Icon. f. 6, 2 e, 1859.

*M. Reirwardii*, De Haan, (ubi. ?) in Reeve Conch. Icon.

*Melanoides Reinwardii*, (De Haan) H. and A. Ad., Gen. of Rec. Moll. 1858.

*Melania Philippinarum*, Sowerby, Mal. Conch. Mag. i, t. 1, f. 1–4, 1838. *Luzon, Manilla, (Philippine Isl.)*

**71. M. dactylus,** Lea, Proc. Zool. S. Lond. 1850.

Hanley, Conch. Misc. t. 6, f. 48, 1857. Reeve, Conch. Icon. f. 7, 1859.

*Melanoides dactylus*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1954, 1859.

*Pachychilus dactylus*, (Lea) Troschel, Geb. der Schneck. 1857. *Guimara, Mindanas, Luzon, Leyte.*

**72. M. perfecta,** Mousson, Moll. Java t. 22, f. 5, 1849. Reeve, Conch. Icon. f. 84, 1859.

*Melanoides perfecta*, (Mouss.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Maros, Célèbes.*

**73. M. Pernambucensis,** Reeve, Conch. Icon. f. 3, 1859. *Pernambuco.*

**74. M. Wallacei,** Reeve, Conch. Icon. f. 66, 1859.

*M. constricta*, Mousson, MSS. *Macassar, Célèbes.*

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**75. M. baccata,** Gould, Proc. Brot, S. N. H. 1847. *Thoungyin Rio, (Burmah.)*

**76. M. batana,** Gould, Proc. Bost. S. N. H. i, p. 144, 1843. *Burmah.*

**77. M. cancellata,** Benson, Journ. As. S. Bengal ii, 119, 1833.

Ann. Mag. N. H. 1842. Hanley, Conch. Misc. t. 2, f. 11, 1854.

*M. Ningpoensis*, Lea, Proc. Ac. N. S. Phil. 1856. Journ. Ac. N. S. Phil. vi, n. s. Obs. Gen. Unio xi, t. 22, f. 20, 1866.

*M. Fortunei*, Reeve, Conch. Icon. f. 97, 1859.

*M. Amurensis*, Gerstfeld, Moll. Sibir. t. 1, f. 14—24, 1859. V. Schrenk, Reise, Amur. Land. ii, p. 627, 1867.

*M. Heukelomiana*, Reeve, Conch. Icon. f. 123, 1859.

*M. calculus*, Reeve, Conch. Icon. f. 117, 1859.
*M. Bensoni*, Reeve, Conch. Icon. f. 96, 1859.
*M. Hanleyii*, Brot, Mall. Blätt. 1860, p. 109.
*Amur Riv.*, *Ningpo*, *Chusan*, (*China.*)

**78. M. circumstriata,** Metcalfe, Proc. Z. S. Lond. 1851; Ann. of N. H. 1853.
Reeve, Conch. Icon. f. 205, 1860.
*Melanoides circumstriata*, (Metc.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Borneo.*

**79. crebricostis,** Benson, Ann. Mag. N. H. 1842, p. 488.
*Hemisinus crebricostis*, (Benson) Brot, Mater. i, p. 61, 1862. (= *M. cancellata*, Benson ?) *Chusan.*

**80. M. episcopalis,** Lea, Proc. Z. S. Lond. 1850.
Hanley, Conch. Misc. f. 27, 1854. Reeve, Conch. Icon. f. 12, 1859.
*Melanoides episcopalis*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1952, 1859.
*Melania infracostata*, Mousson, Moll. Java t. 10, f. 3, 1849. Reeve, Conch. Icon. f. 14, 1859.
*Melanoides infracostata*, (Mouss.) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania sparsimnodosa*, von dem Busch. Mal. Blätt. 1858. Reeve, Conch. Icon. f. 208, 1860.
*Melania pontificalis*, von dem Busch, Zeitsch. Mal. 1850.
*Melania Brookei*, Reeve, Conch. Icon. f. 207, 1860.
*Malacca*, *Java*, *Borneo.*

**81. (?) M. fluctuosa,** Gould, Proc. Bost. S. N. H, 1847.
*Tavoy*, (*Burmah*).

**82. (?) M. Hainesiana,** Lea, Proc. Ac. N. S. Phil. 1856. Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio xi, t. 22, f. 18, 1866. *India.*

**83. M. Henriettæ,** Gray, Griff. Cuv. t. 13, f. 2, 1834.
Reeve, Conch. Icon. f. 1, 1859.
*M. reticulata*, Lea, Proc. Z. S. Lond. 1850.
*Melanoides reticulata*, Lea, H. and A. Ad., Gen. of Rec. Moll. 1858. *China.*

**84. M. Menkiana,** Lea, Obs. Gen. Unio iv, 24, 1841.
Reeve, Conch. Icon. f. 13, 1859.
*M. plicata*, Lea, Trans. Am. Phil. S. Phil. vi, t. 23, f. 95, 1835.
*Io plicata*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1975, 1859.
*Melania spinosa*, Benson, (ubi.?) Hanley, Conch. Misc. f. 7, 1854. *Bengal. ?*

**85. ? M. praemordica,** Tryon, Am. Journ. Conch. ii, t. 10, f. 3, p. 111, 1866. *Burmah.*

**86. M. Reevei,** Brot, Mater. i, p. 46, 1862.
*M. balteata*, Reeve, (non Philippi) Conch. Icon. f. 144, 1860.

**87. M. Sooloensis,** Reeve, Conch. Icon. f. 31, 1859.
*Sooloo Isl.*

**88. M. torquata,** von dem Busch, Phil. Abbildg. t. 1, f. 18, 1842.
Mousson, Moll. Java t. 12, f. 2; t. 22, f. 2, 1849.
*M. terebra*, Benson, (non Lesson) Journ. Ac. N. S. Calcutta v, p. 747, 1836. Reeve, Conch. Icon. f. 59, 1859.
*Java, Bengal.*

**89. M. Tourannensis,** Souleyet, Voy. Bonite, t. 31, f. 4–7, 1839–44.
*Melanatria Tourannensis*, (Soul.) Gray, Guide Syst. Distr. 1857. *Cochin-china.*

**90. M. variabilis,** Benson, Journ. Asiat. Soc. Calcutta, 1835. Reeve, Conch. Icon. f. 204, 1860.
*Melanatria variabilis*, (Bens.) Gray, Guide Syst. Distr. 1857.
*Melania Indica*, Soul., Voy. Bonite, t. 31, f. 12, 1839–44.
*Melanoides Indica*, (Soul.) H. and A. Ad., Gen. of Rec. Moll. i, t. 21, f. 5, 1858.
*Melania Herculea*, Gould, Proc. Bost. S. N. H. ii, p. 100. Reeve, Conch. Icon. f. 4, 1859. Reeve, Syst. Conch. t. 194, 1843. Brot. Mater. ii, t. 3, f. 1–3, 1868.
*Melanoides Herculea*, (Gould) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania Sp.* in Sow. Gen. of Shells f. 2, 1820–24.
*Melania varicosa*, Troschel, Wiegm. Archiv. 1837. Philippi, Abbildg. t. 2, f. 2, 3, 1843. Mousson. Moll. Java t. 10, f. 4, 1849.
*Melanoides varicosa*, (Trosch.) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania corrugata*, (Lam.) Reeve, (non Lamarck) Conch. Icon. f. 10, a, b; 67, 1859.
*Melania gloriosa*, Anthony, Am. Journ. Conch. i, t. 18, f. 3, 1865.
*Ganges, India, Ceylon ?* (*Thwaites*), *Bengal, Java, Pégu.*

§ 7.

(*Melania,* H. and A. Adams, 1858.)

**91. M. aculeus,** Lea, Trans. Am. Phil. S. Phil. v, t. 19, f. 72, 1833.

Lea, Obs. Gen Unio i, t. 19, f. 72. Lea, Proc. Z. S. Lond. 1850. Hanley, Conch. Misc. f. 33, 1854.
*Java ? Philippine Isl.*

**92. M. acutissima,** von dem Busch., Mall. Blätt. 1858, p. 33, Reeve, Conch. Icon. f. 57, 58, 1859. *Guadeloupe. (? !)*

**93. M. aerea,** Reeve, Conch. Icon. f. 64, 1859.
*Philippine Isl.*

**94. M. albovittata,** Brot, Mater. i, p. 47, 1862.
*Melania vittata*, Brot, Rev. Zool. 1860, t. 17, f. 7.
*Melania cincta*, Lea, var. in Reeve, Conch. Icon. Errata.
*Philippine Isl.*

**95. M, anthracina,** von dem Busch, Phil. Abbildg. t. 3, f. 3, 1844.
(?) Reeve, Conch. Icon. f. 17, 1859. *Java. ?*

**96. M. Arroensis,** Reeve, Conch. Icon. f. 48, 1859.
*Arroo Isl.*

**97. M. aspirans,** Hinds., Ann. Mag. N. H. xiv, p. 8, 1844. Voy. Sulphur t. 15, f. 9, 10, 1843–45. Hanley, Conch. Misc. f. 47, 1857. Chenu, Ill. Conch. t. 2, f. 9, 1843. Mousson, Moll. Java t. 11, f. 5, (?) t. 22, f. 3, 1849. Chenu, Man. Conch. f. 1991, 1859.
*Feejee Isl., Bimah, Viti Lewu, Ovalan*, (Gräffe).

**98. M. aterrima,** Cristoforis Jan., Catal. Coll.

**99. M. baculus,** Reeve, Conch. Icon. f. 130, 1860.

**100. M. biflammata,** Reeve, Conch. Icon. f. 85, 124, 1859.
*Solomon's Isl.*

**101. M. blatta,** Lea, Proc. Z. S. Lond. 1850.
Hanley, Conch. Misc. f. 49, 1857. Reeve, Conch. Icon. f. 16, 1859. *Philippine Isl.*

**102. M. Blossevilliana,** Lesson, Voy. Coquille, ii, p. 358, 1829. *New Guinea.*

**103. M. Buschiana,** Reeve, Conch. Icon. f. 50, 1859.
*California. (? !)*

**104. M. bullioides,** Reeve, Conch. Icon. f. 65, 1859.
*Philippine Isl.*

**105. M. canalis,** Lea, Proc. Z. S. Lond. 1850.
Reeve, Conch. Icon. f. 63, 1859. (non Gassies, Faun. Nov. Caled.) *Philippine Isl.*

**106. M. carbonata,** Reeve, Conch. Icon. f. 88, 1859.

**107. M. cincta,** Lea, Proc. Z. S. Lond. 1850.
Reeve, Conch. Icon. f. 35, 1859. *India.*

**108. (?) M. coarctata,** Lamarck, (non Philippi; nec. Reeve,) An. s. V. No. 3, 1822.
Chenu, Man. Conch. f. 1967, 1859.
*Melania strangulata*, Encycl. Méth. t. 458, f. 5, a, b, 1816.
(?) *M. agrestis*, Reeve, Conch. Icon. f. 140, 1860.
*India, ? Borneo.*

**109. M. corrugata,** Lamarck, An. s. V. No. 5, 1822. (non Reeve, Conch. Icon.)
Delessert, Rec. Coq. t. 30, f. 10, 1841. Chenu, Ill. Conch. t. 2, f. 18. Chenu, Leçons. Elem. f. 497, 1847. Chenu, Man. Conch. f. 1951, 1859.
*Melania semidecussata*, Encyclop. *Vanikoro.*

**110. M. costata,** Quoy, Gaimard, Voy. Astrol. t. 56, f. 34–37, 1826–34.
Reeve, Conch. Icon. f. 28, 29, 1859.
*Melasma costata*, (Q. G.) Chenu, Man. Conch. f. 2000, 1859.
*Bulimus plicarius*, Bruguiere, Encycl. No. 52, 1792.
*Helix plicaria*, Born, t. 16, f. 14, 1780. Wood, Ind. Test. f. 139, 1825.
*Melania plicaria*, (Brug.) Chenu, Man. Conch. f. 1985, 1859.
*Melania hastula*, Lea, Proc. Z. S. Lond. 1850. H. and A. Ad., Gen. of Rec. Moll. i, t. 32, f. 1c, 1858. Hanley, Conch. Misc. f. 21, 1854.
*Philippines, Almaheira*, (Landauer).

**111. M. crenulata,** Deshayes in Lam., An. s. V. No. 17, 1838.
*Helix turrita crenulata*, Chemn, Conch. t. 135, f. 1230, 1786.
*Helix crenata*, Gmelin, 3655, in Wood. Ind. Test. f. 143, 1825.
*Melania crenulata*, (Chemn.) Reeve, Conch. Icon. f. 26, 1859.
*Melania torulosa*, Bruguière, Dict. Sc. Nat. xxix, p. 464, 1823.
*Melania cuspidata*, Menke, MSS. Mus. Menk.
*Melania hastula*, (Lea) Chenu. Man. Conch. f. 1983. (non Lea,) 1859.
*M. Tirouri*, (Ferussac) Desh. in Lam., An. s. V. No. 18, 1838. Chenu, Man. Conch. f. 1986, 1859. Quoy, Gaimard, Voy. Astrol. t. 56, f. 38, 39, 1826–34. H. and A. Ad., Gen. of Rec. Moll. 1858.
*M. porcata*, Jonas, Zeitsch. Mal. 1844, p. 50. Phil. Abbildg. t. 4, f. 19, 1847. Mousson, Moll. Java t. 11, f. 4, 1849. Reeve, Conch. Icon. f. 37, a. (nom. *semicancellata*,) 1859. Chenu, Man. Conch. f. 1990. (nom. *aculeus*, Lea,) 1859. H. and A. Ad., Gen. of Rec. Moll. 1858.

*M. monilifera*, von dem Busch, Mal. Blätt. 1858, p. 34. Reeve, Conch. Icon. f. 112, 1859.
*M. confusa*, Dohrn., Proc. Z. S. Lond. 1858, p. 135.
*Philippine Isl., Célèbes, Manilla, Java, Solomon's Ils., Ceylon.*

**112. M. Cumingii,** Lea, Proc. Z. S. Lond. 1850. Reeve, Conch. Icon. f. 23, 1859. *Philippines.*

**113. M. cuspidata,** Chemnitz.
*Helix cuspidata*, Chemnitz, Conch. f. 1228, 1786. Wood, Ind. Test. f. 138, 1825.
*Melania cuspidata*, (Chem.) H. and A. Ad., Gen. of Rec. Moll. 1858. (An = *cuspidata*, Menke; = *crenulata*, Desh. ?)

**114. M. duplex,** Brot. Mater. i, p. 48, 1862.
*M. australis*, Lea, Proc. Ac. N. S. Phil. 1856.
*M. Manillaensis*, Lea, Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio xi, t. 22, f. 24, 1866. *Manilla.*

**115. M. fauna,** Lesson, Voy. Coquille ii, p. 355, 1829. *New Ireland.*

**116. M. fimbriata,** Thorpe, (ubi. ?) Hanley, Conch. Misc. f. 32, 1854.

**117. M. forulata,** Reeve, Conch. Icon. f. 122, 1859.

**118. M. flammulata,** von dem Busch, Phil. Abbildg. t. 1, f. 3, 4, 1842.
(?) Reeve, Conch. Icon f. 45, 1859. H. and A. Ad., Gen. of Rec. Moll. 1858. *Java.*

**119. M. figurata,** Hinds, Ann. Mag. N. H. xiv, p. 8, 1844. Voy. Sulph. t. 15, f. 13, 1843—45. Chenu, Ill. Conch. t. 2, f. 24. Mousson, Moll. Java, t. 22, f. 4, 1849. ? Reeve, Conch. Icon. f. 49, 1859. H. and A. Ad., Gen. of Rec. Moll. 1858. *Célèbes, New Ireland.*

**120. M. Fraseri,** von dem Busch, Proc. Z. S. Lond. 1859. (An = *M. terebra* v. d. B. ?) *Ecuador* (*?*)

**121. M. fulgida,** Reeve, Conch. Icon. f. 24, 1859. *Philippines.*

**122. M. fumosa,** Hinds, Ann. Mag. N. H. xiv, p. 8, 1844. Voy. Sulph. t. 15, f. 11, 12, 1843—45. Chenu, Ill. Conch. t. 2, f. 11. Chenu, Man. Conch. f. 1994, 1859. Brot, Mater. ii, t. 2, f. 12, 1868. H. and A. Ad., Gen. of Rec. Moll. 1858, (non Hanley, Conch. Misc.)
*M. obstricta*, Reeve, Conch. Icon. f. 30, 1859.
*Port Carteret* (*New Ireland*), *I. Batjan, Moluccas.*

**123. M. funiculus,** Quoy, Gaimard, Voy. Astrol. t. 56, f. 43–44, 1826—34.
H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1984, 1859. *Moluccas.*

**124. M. fuscata,** Born., (non Deshayes nec Chemnitz).
*Helix fuscata*, Born., t. 16, f. 17, 1780. Wood, Ind. test. f. 144, 1825.

**125. M. infumata,** Brot.
*M. fuscata*, Deshayes, (non Born., nec Chemn.) Traité. Elém. Conch. t. 74, f. 10, 1839.

**126. M. graciosa,** Lesson, Voy. Coquille, ii, p. 359, 1829. *New Guinea.*

**127. M. juncea,** Lea, Proc. Z. S. Lond. 1850.
H. and A. Ad., Gen. of Rec. Moll. 1858. Reeve, Conch. Icon. f. 33, 1859. *Luzon.*

**128. M. lancea,** Lea, Proc. Z. S. Lond. 1850.
Reeve, Conch. Icon. f. 39, 1859. *Society Isl.*

**129. M. lævigata,** Lamarck, An. s. V. No. 7.
Delessert, Rec. Coq. t. 30, f. 12, 1841. Chenu, Ill. Conch. t. 2, f. 20. *Timor.*

**130. M. Latronum,** Tarnier MSS. *I. Ladrones.*

**131. M. macilenta,** Menke, Synops. Meth. p. 43, 1830.
*Helix maculata*, Born., t. 16, f. 15, 1780.
(?) *Helix undulata*, Gmelin, 3654, in Wood Ind. test. f. 140, 1825.

**132. M. macrospira,** Morelet, Test. nov. Austral. 1857.
Reeve, Conch. Icon. f. 240, 1860. (?) Gassies, Faun. nov. Caled. t. 6, f. 3. *New Caledonia.*

**133. M. mucronata,** von dem Busch, Zeitsch. Mal. 1853, p. 177.
(An = *M. costata*, Q. G. var. ?)

**134. Offachiensis,** Lesson, Voy. Coquille, ii, p. 356, 1829. *Waïgiou.*

**135. M. palimpsestos,** Reeve, Conch. Icon. f. 111, 1859.

**136. M. perrimosa,** Reeve, Conch. Icon. f. 114, 1859.

**137. M. Philippii,** Adams, (ubi?)
*M. picta*, Phil., Zeitsch. Mal. 1848, p. 154, (non Hinds).
*M. Philippii*, H. and A. Ad., Gen. of Rec. Moll. 1858. *Manilla.*

**138. (?) M. phlebotomum,** Reeve, Conch. Icon. f. 105, 1859.
*West Africa.*

**139. M. picta,** Hinds, Ann. Mag. N. H. xiv, p. 8, 1844.
Voy. Sulphur. t. 15, f. 3, 1843—45. H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Ill. Conch. t. 2, f. 4. (?) Reeve, Conch. Icon. f. 43, 1859. Chenu, Man. Conch. f. 1992, 1859. *New Ireland.*

**140. M. plicatilis,** Mousson, MSS. Catal. Godeffroy. *Ovalau.*

**141. M. Plutonis,** Hinds, Ann. Mag. N. H. xiv, p. 8, 1844.
Voy. Sulph. t. 15, f. 14, 1843—45. H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Ill. Conch. t. 2, f. 22. Reeve, Conch. Icon. f. 36, 1859. *Feejee Isl.*

**142. M. pugioniformis,** Philippi, Zeitsch. Mal. 1851, p. 83.

**143. (?) M. rufescens,** Martens, Mal. Blätt. 1860, p. 47.
*M. Martensi,* Brot, Mater. i, p. 48, 1862. *Japan.*

**144. M. rustica,** Mousson, Journ. Conch. 1857, p. 160.
Reeve, Conch. Icon. f. 21.
*M. digitalis,* Mousson, Journ. Conch. 1857, p. 160. Brot, Mater. ii, t. 2, f. 11, 1868. (Status juvenilis). *Java.*

**145. M. Samoensis,** Reeve, Conch. Icon. f. 60, 1859.
*Samoë Isl.; Upolu* (Gräffe).

**146. M. Scipio,** Gould, Proc. Bost. S. N. H. 1847.
Exped. Shells f. 156, 1852. H. and A. Ad., Gen. of Rec. Moll. 1858.
*M. Belone,* Philippi, Zeitsch. Mal. 1851, p. 81.
*M. veruculum,* Morelet, Journ. Conch. 1851, t. 5, f. 3, 1852, p. 262, 1856, p. 36. H. and A. Ad., Gen. of Rec. Moll. 1858. *Navigator's Isl.; Samoa Isl.*

**147. M. semicancellata,** von dem Busch, Phil. Abbildg. t. 3, f. 3, 1844.
Reeve, Conch. Icon. f. 37. b, 1859. H. and A. Ad., Gen. of Rec. Moll. 1858. *Java ?*

**148. M. spadicea,** Philippi, Zeitsch. Mal. 1848, p. 154.
H. and A. Ad., Gen. of Rec. Moll. 1858. *Manilla.*

**149. M. subula,** Lea, Proc. Zool. S. Lond. 1850.
H. and A. Ad., Gen. of Rec. Moll. 1858. Reeve, Conch. Icon. f. 62, 1859. *Philippines.*

**150. M. subulata,** Lamarck, An. s. V. No. 6, 1822.
(Non Sowerby, Gen. of Shells, nec Sowerby Man. Conch., nec Chemnitz). Delessert, Rec. Coq. t. 30, f. 11, 1841. Chenu, Ill. Conch. t. 2, f. 19, (non Chenu, Man. Conch.)

**151. M. subsuturalis,** Metcalfe, Proc. Zool. S. Lond. 1851, p. 73.
*M. Metcalfei*, Reeve, Conch. Icon. f. 212, 1860. *Borneo.*

**152. M. terebriformis,** Brot, Mater. i, p. 51, 1852.
*M. terebra*, von dem Busch, Phil, Abbildg. t. 1, f. 17, 1842, (non Benson, nec Lesson). H. and A. Ad., Gen. of Rec. Moll. 1858. Reeve, Conch. Icon. f. 46, 1859.
*M. subulata*, Sowerby, Gen. of Shells, f. 3, 1820—24. *Java.*

**153. M. uniformis,** Quoy, Gaimard, Voy. Astrol. t. 56, f. 30–35, 1826—34.
H. and A. Ad., Gen. of Rec. Moll. 1858. (non Reeve Conch. Icon). *Célèbes.*

**154. M. unisulcata,** Reeve, Conch. Icon. f. 44, 1859.

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**155. M. angusta,** Philippi, Abbildg. t. 5. f. 9, 1848.
H. and A. Ad., Gen. of Rec. Moll. 1858.

**156. M. arctecava,** Mousson, Journ. Conch. 1857, p. 161.
Reeve, Conch. Icon. f. 71, 1859. *Java.*

**157. (?) M. Bensoni,** Philippi, (non Reeve) Zeitsch. Mal. 1851, p. 82. *Liew Kiew.*

**158. M. lævis,** Gray, Griff. Cuv. t. 14, f. 8, 1834.
Reeve, Conch. Icon. f. 40, 1859.

**159. M. Mindorensis,** Lea, Proc. Z. S. Lond. 1850.
H. and A. Ad., Gen. of Rec. Moll. 1858. Reeve, Conch. Icon. f. 34, 1859.
*M. litigiosa*, Brot, Rev. Zool. 1860, t. 16, f. 4. *Mindoro.*

**160. M. monile,** Mousson, Journ. Conch. 1857, p. 162. *Java. ?*

**161. M. ornata,** von dem Busch, Phil. Abbildg. t. 1, f. 15, 16, 1842.
Reeve, Conch. Icon. f. 146, 1860. *Java.*

**162. M. pantherina,** von dem Busch, Malac. Blätt. 1858, p. 33.
Reeve, Conch. Icon. f. 38, 1859. *Philippines.*

**163. M. punctata,** Lamarck, An. s. V. No. 4, 1822.
Delessert, Rec. Coq. t. 30, f. 9, 1841. Chenu, Ill. Conch. t. 2, f. 14. Chenu, Man. Conch. f. 1987, 1859, (non Pot. Mich. Gal. Moll).
*M. albescens*, Lea, Proc. Zool. S. Lond. 1850. Reeve, Conch. Icon. f. 42, 1859. Hanley, Conch. Misc. f. 52, 54, 1857. H. and A. Ad., Gen. of Rec. Moll. 1858. *Philippines.*

**164. M. rimata,** Reeve, Conch. Icon. f. 94, 1859.

**165. M. Timorensis,** Reeve, Conch. Icon. f. 79, 1859. *Timor.*

**166. M. tristis,** Reeve, Conch. Icon. f. 121, 1859. *Java.*

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**167. M. acuminata,** Dunker, Phil. Abbildg. t. 3, f. 5, 1844.
*M. acus*, Lea, Proc. Zool. S. Lond. 1850. Reeve, Conch. Icon. f. 92, 1859. H. and A. Ad., Gen. of Rec. Moll. 1858. *Philippines.*

**168. M. albizonata,** Mousson, MSS. Catal. Godeffroy. *Ovalau.*

**169. M. amabilis,** von dem Busch, in Reeve Conch. Icon. f. 223, 1860.
*M. pulchra*, von dem Busch, Mal. Blätt. 1858, p. 35. *Célèbes.*

**170. M. cimelium,** Reeve, Conch. Icon. f. 52, 1859. *Solomon's Isl.*

**171. M. clavus,** Lamarck, An. s. V. No. 8, 1822.
Delessert, Rec. Coq. t. 30, f. 13, 1841. Chenu, Ill. Conch, t, 2, f. 21.
*Melanoides clavus*, H. and A. Ad., Gen. of Rec. Moll. 1858.

**172. M. costellaris,** Lea, Proc. Zool. S. Lond. 1850.
Hanley, Conch. Misc. f. 59, 1857. Reeve, Conch. Icon. f. 98, 1859.
*Aylacostoma costellaris*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. *Siquijor, Negros.*

**173. (?) M. Doreyiana,** Lesson, Voy. Coquille ii, p. 358, 1829. *Havre Dorey (N. Guinea.)*

**174. M. florata,** Hinds, Ann. Mag. N. H. xiv, p. 10, 1844.
Voy. Sulph. t. 15, f. 22, 1843—45. Chenu, Ill. Conch. t. 2, f. 17. Reeve, Conch. Icon. f. 89, 1859. H. and A. Ad., Gen. of Rec. Moll. 1858. *New Ireland.*

**175. M. floricoma,** Reeve, Conch. Icon. f. 99, 1859.

**176. M. fulgurans,** Hinds, Ann. Mag. N. H. xiv, p. 9, 1844.
Voy. Sulph. t. 15, f. 6, 1843—45. Chenu, Ill. Conch. t. 2, f. 7. Chenu, Man. Conch. f. 1993, 1859. Reeve, Conch. Icon. f. 55, 1859. H. and A. Ad., Gen. of Rec. Moll. 1858. *New Ireland.*

**177. M. gaudiosa,** Hinds, Ann. Mag. N. H. xiv, p. 10, 1844.
Voy. Sulph. t. 15, f. 19, 1843—45. Chenu, Ill. Conch. t. 2, f. 15. *New Ireland.*

**178. M. Housei,** Lea, Proc. Ac. N. S. Phil. 1856.
Journ. Ac. N. S. Phil. vi, n. s. Obs. Gen. Unio xi, t. 22. f. 22, 1866. *Takrong Riv. Korat (Siam).*

**179. M. impura,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 216, 1859.
*Aylacostoma impurus,* Lea, H. and A. Ad., Gen. of Rec. Moll. 1858. *Philippines.*

**180. M. luctuosa,** Hinds, Ann. Mag. N. H. xiv, p. 9, 1844.
Voy. Sulph. t. 15, f. 1, 1843—45. Chenu, Ill. Conch. t. 2, f. 1. Reeve, Conch. Icon. f. 61, 1859. H. and A. Ad., Gen. of Rec. Moll. 1858. *Feejee Isl.*

**181. M. moesta,** Hinds, Ann. Mag. N. H. xiv, p. 9, 1844.
Voy. Sulph. t. 15, f. 4, 1843—45. Chenu, Ill. Conch. t. 2, f. 3.
*Aylacostoma moestus,* (Hinds) H. and A. Ad., Gen. of Rec. Moll. 1858. *Feejee Isl.*

**182. M. papuensis,** Quoy, Gaimard. Voy. Astrol. t. 56, f. 45—47, 1826—34.
*Melanoides papuensis,* (Q. G.) H. and A. Ad., Gen. of Rec. Moll. 1858. *New Guinea.*

**183. (?) M. pireniformis,** v. Martens, Mal. Blätt. 1863, p. 135. *Burn Isl.*

**184. M. plana,** von dem Busch, MSS. (fide Cuming) ubi? *Philippine.*

**185. M. pyramis,** Benson, (non von dem Busch) ubi?
Reeve Conch. Icon. f. 51, (non 102) 1859. *Borneo.*

**186. M. pyramidata,** Hinds, Ann. Mag. N. H. xiv, p. 10, 1844.
Voy. Sulph. t. 15, f. 20, 1843—45. Chenu, Ill. Conch. t. 2, f. 23.
*Melanoides pyramidata,* (Hinds) H. and A. Ad., Gen. of Rec. Moll. 1858. *New Ireland.*

**187. M. Schomburgki,** Hanley, MSS. (Mus. Cuming).
Reeve, Conch. Icon. f. 93, 1859. *Siam.*

**188. M. sobria,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 32, 80, 1859.
*Aylacostoma sobrius,* (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858.

VAR.

*M. cochlidium,* Lea, var. Proc. Z. S. Lond. 1850. Reeve, Conch. Icon. f. 27, 1859.
*Aylacostoma cochlidium,* (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. *Philippines.*

§ 8.

(*Striatella*, Brot.)

**189. M. affinis,** Lea, Proc. Ac. N. S. Phil. 1856.
Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio xi, t. 22, f. 23, 1866. *Manilla.*

**190. M. Arthurii,** Brot.
*M. speciosa*, Morelet, (non Adams) Test. nov. Austral. 1857.
*M. Moreleti*, Reeve, (non Deshayes) Conch. Icon. f. 239, 1860. *New Caledon.*

**191. M. brunnescens,** Tryon, Am. Journ. Conch. i, t. 22, f. 1, 1865. *Philippines.*

**192. M. corporosa,** Gould, Proc. Bost. S. N. H. 1847.
Expedit. Shells f. 161, 1852. Reeve, Conch. Icon. f. 68, 1859.
*M. bicolor*, Brot, Rev. Zool. 1860, t. 17, f. 12.
*M. incisa*, Reeve, Conch. Icon. f. 118, 1859.
(?) *M. gracilina*, Gould, Proc. Bost. S. N. H. vii, 1859.
*M. unicolor*, Tryon, Am. Journ. Conch. i, t. 22, f. 2, 1865.
*M. Tahitensis*, Dunker, Verhandlg. K. K. Zool. Bot. Ges. Wien, 1866. Reise der Novarra t. 1, f. 8, 1867.
*M. luteola*, Dunker, Verhandlg. K. K. Zool. Bot. Ges. Wein, 1866. Reise der Novarra t. 1, f. 9, 1867. *Taïti.*

**193. M. crepidinata,** Reeve, Conch. Icon. f. 120, 1859. *Java.*

**194. M. divisa;** Philippi, Zeitsch. Mal. 1851, p. 81. *Solomon's Isl.*

**195. M. exusta,** Reeve, Conch. Icon. f. 74, 1859.
*M. maurula*, (Reeve) Gassies, Faun. Nov. Caled. t. 5, f. 9, 1863, (non Reeve). *New Caledon.*

**196. M. ferrea,** Reeve, Conch. Icon. f. 9, 1859.
(an = *corporosa*, Gould. ?) *Borneo, West Africa.*

**197. M. Gouldiana,** Reeve, Conch. Icon. f. 115, 1859. *New Caledonia.*

**198. M. humilis,** Philippi, Zeitsch. Mal. 1851, p. 82.

**199. M. indefinita,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 56, 1859. (exclus. synon.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Luzon.*

**200. M. Javanica,** von dem Busch, MSS.
*M. coarctata*, (Lam.) Philippi, Abbildg. t. 4, f. 20, (non Lamarck) 1847. Reeve, Conch. Icon. f. 22, 1859.

**201. M. Landaueri,** Brot, Mal. Blätt. 1865.
Brot. Mater. ii, t. 2, f. 2, 3, 1868. *Arrow Isl. ?*

**202. M. latebrosa,** Hinds., Am. Mag. N. H. xiv, p. 10, 1844. Voy. Sulph. t. 15, f. 21, 1843–45. Chenu, Ill. Conch. t. 2, f. 13.
*Melanoides latebrosa*, (Hinds) H. and A. Ad., Gen. of Rec. Moll. 1858. *New Ireland.*

**203. M. lutosa,** Gould, Proc. Bost. S. N. H. 1847.
Exped. Shells f. 159, 1852.
*Ceriphasia lutosa*, (Gould) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania Gräffei*, Mousson, MSS. Brot, Mater. ii, p. 18, 1868.
*M. interposita*, Mousson, MSS. Brot, Mater. ii, p. 18, 1868, *Feejee Isl.*

**204. (?) M. lyraeformis,** Lea, Proc. Ac. N. S. Phil. 1856.
Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio xi. t. 22, f. 25, 1866. *Manilla.*

**205. M. Mageni,** Gassies, Faun. Nov. Caled. t. 6, f. 10, 1863. *Balade*, (*N. Caled.*)

**206. M. Matheroni,** Gassies, Faun. Nov. Caled. t. 4, f. 5, 1863. *Balade*, (*N. Caled.*)

**207. M. Maurula,** Reeve, (non Gassies Faun. N. Cal.) Conch. Icon. f. 15, 1859. *Guinea.*

**208. M. minuta,** Tryon, Am. Journ. Conch. ii, t. 20, f. 3, 1866. *Taïti.*

**209. M. Montrouzieri,** Gassies, Faun. Nov. Caled. t. 5, f. 10, 1863. *Art*, *Balade*, (*New Caled.*)

**210. M. Myersiana,** Lea, Proc. Ac. N. S. Phil. 1856.
Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio xi, t. 22, f. 21, 1866. *Feejee Isl.*

**211. M. Newcombii,** Lea, Proc. Ac. N. S. Phil. 1856.
Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio xi, t. 22, f. 17, 1866. *Sandwich I.*

**212. M. obscura,** Brot, Rev. Zool. 1860, t. 17, f. 9. *Hab.—?*

**213. M. paulla,** Dunker, MSS. (ubi. ?) *Sandwich I.*

**214. M. Petitii,** Philippi, Zeitsch. Mal. 1848, p. 153.
? Hanley, Conch. Misc. f. 46, 1857. Brot, Mater. ii, t. 2, f. 7, 8, 1868, (non Reeve, Conch. Icon.)
*M. Droueti*, Gassies, Faun. Nov. Caled. t. 5, f. 11, 1863.
*? M. Erebus*, Reeve, Conch. Icon. f. 75, 1859. *New Caledon.*

**215. M. recta,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 41, 1859.
*Aylacostoma rectus*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. *Philippines,*

**216. M. retifera,** Tryon, Am. Journ. Conch. i, t. 22, f. 4, 1865. *Japan.*

**217. M. semiornata,** Brot, Rev. Zool. 1860, t. 16, f. 5. *Java.*

**218. M. subfasciata,** Mousson, MSS. Catal. Godeffroy. *Upolu.*

**219. M. sulcata,** Brot, Mater. i, p. 18, 1868.
*M. circumsulcata*, Gassies, (non von dem Busch) Journ. Conch. 1865, p. 212. *New Caledonia.*

**220. (?) M. Waigiensis,** Lesson, Voy. Coquille ii, p. 355, 1829. *Waigiou.*

**221. M. Vainafa,** Gould, Proc. Bost. S. N. H. 1847.
Exped. Shells t. 10, f. 157, 1852.
*Ceriphasia Vainafa*, (Gould) H. and A. Ad., Gen. of Rec. Moll. 1858. *Upolu.*

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**222. M. adspersa,** Troschel, Archiv. f. Nat. Gesch. 1837, i, p. 175.
Philippi, Abbildg. t. 5, f. 6, 1848.
*Hemisinus adspersus*, (Troschel) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania flammigera*,Dunker, Phil. Abbildg. t. 3, f. 11, 1844. *Ganges.*

**223. M. Assavaensis,** Mousson, MSS.
*M. tuberculata* var. *Assavaensis*, Mouss., Catal. Godeffroy. *Assava Viti.*

**224. M. Boninensis,** Lea, Proc. Ac. N. S. Phil. 1856.
Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio xi, t. 22, f. 15, 1866. *Bonin I.*

**225. M. clavulus,** Mousson, Journ. Conch. 1865, p. 202. *Feejee Isl.*

**226. M. Commersoni,** Morelet, Sér. Conch. p. 116, t. 6, f. 4. 1860.
Reeve, Conch. Icon. f. 237, 1860. *Madagascar.*

**227. M. cylindracea,** Mousson, Moll. Java t. 11, f. 9, 1849.
*Melanoides cylindracea*, (Mousson) H. and A. Ad., Gen. of Rec. Moll. 1858. *Pardana, (Java.)*

**228. M. Dembea,** Rüppel, MSS. Mus. Cuming.
Reeve, Conch. Icon. f. 161, 1859.
*Tarebia Dembea*, (Rüppel) H. and A. Ad., Gen. of Rec. Moll. 1858. *Lake Dembea*, (*Abyssinia.*)

**229. M. erythrostoma,** Quoy, Gaimard, Voy. Astrol. t. 56, f. 15–18, 1826–34.
*Melanoides erythrostoma*, (Q. G.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Vanikoro.*

**230. M. fontinalis,** Philippi, Abbildg. t. 5, f. 7, 1848.
Reeve, Conch. Icon. f. 119, 1859. *Poulo Penang.*

**231. M. gemmulata,** Reeve, Conch. Icon. f. 86, 1859.
*M. pyramis*, von dem Busch, (non Benson) Phil. Abbildg. t. 4, f. 16, 1847.
*M. tuberculata*, (Müll.) var. Morelet, Sér. Conch. p. 113, 1860. *India.*

**232. M. inhonesta,** von dem Busch, Phil. Abbildg. t. 4, f. 5, 1847.
(?) Reeve, Conch. Icon. f. 226, 1860.
*M. inhonesta*, (v. d. B.) H. and A. Ad., Gen. of Rec. Moll. 1858. ? Mousson, Moll. Java p. 71, (an eadem ?)
*Malang*, (Mousson); *Java. ?*

**233. M. Judaica,** Roth, Malac. Blätt. 1855, t. 2, f. 1–3.
Reeve, Conch. Icon. f. 103, 1859. *Palestine.*

**234. M. Mauriciæ,** Lesson, Voy. Coquille, ii, p. 354, 1829 (an = *M. tuberculata*, Müll. ?) *Mauritius.*

**235. M. Nicobarica,** Mörch MSS. Mus. von dem Busch.
H. and A. Ad., Gen. of Rec. Moll. 1858. Reeve, Conch. Icon. f. 54, 1859. *Nicobar.*

**236. M. nodocincta,** Dohrn, Proc. Zool. S. Lond. 1865.
*Lake Nyassa.*

**237. M. Ovalana,** Mousson MSS. Catal. Godeffroy, iv.
*1. Ovalan.*

**238. M. Peasei,** Tryon, Am. Journ. Conch. ii, t. 20, f. 5, 1866. *Feejee I.*

**239. M. perpinguis,** Hinds, Ann. Mag. N. H. xiv, p. 9, 1844.
Voy. Sulph. t. 15, f. 2, 1843–45. Chenu, Ill. Conch. t. 2, f. 2. Reeve, Conch. Icon. f. 113, 1859 (? non Gould, Expedit. Shells).
*Melania perpinguis*, Hinds, H. and A. Ad. Gen. of Rec. Moll. 1858.

*M. turriculus*, Lea, Proc. Zool. S. Lond. 1850. Hanley, Conch. Misc. f. 55, 1857.
*Melania turriculus*, Lea, H. and A. Ad. Gen. of Rec. Moll. 1858. *Fejee Isl., Luzon.*

**240. M. rivularis,** Philippi, Abbildg. t. 4, f. 6, 1847.
*Melania rivularis*, Phil., H. and A. Ad. Gen. of Rec. Moll. 1858. *Java.*

**241. M. scitula,** Gould, Proc. Bost. S. N. H. 1847.
Exped. Shells, t. 10, f. 158, 1852. *Upolu.*

**242. M. suturalis,** Philippi, Abbildg. t. 4, f. 17, 1847.

**243. M. Tamsii,** Dunker, Zeitsch. Mal. 1845, p. 165.
Dunker, Ind. Moll. Guin. t. 2, f. 9, 10, 1853 (? an Reeve, Conch. Icon.) *I. S. Anton.*

**244. M. terebra,** Lesson (non Benson nec von dem Busch), Voy. Coquille ii, p. 354, 1829. *New Guinea.*

**245. M. truncatula,** Lamarck, An. s. V. No. 15, 1822 (non Quoy, Gaimard. Astrol.)
Delessert, Rec. Coq. t. 30, f. 17, 1841. Chenu, Ill. Conch. t. 2, f. 28. Potiez, Michaud. Gal. t. 27, f. 21, 22, 1838 (an = *M. tuberculata*, Müll.?) *Timor, Malabar.*

**246. M. tuberculata,** Müller, (Nerita) Verm. p. 191, No. 378 (non Schröter), 1773.
Chemnitz, ix, p. 189, t. 136, f. 1262, 1786. Philippi, Abbildg. t. 1, f. 19, 1842. Mousson, Moll. Java, t. 11, f. 6, 7, 1849. Reeve, Conch. Icon. f. 87, 110, 1859. Bourguignat, Malac. Alg. 1864–66.
*Melanoides tuberculata*, Müll. H. and A. Ad. Gen. of Rec. Moll. 1858.
*Melania fasciolata*, Olivier, Voy. t. 31, f. 7, 1801–7. Lamarck, An. s. V. No. 16, 1822. Caillaud, Voy. Meroë, t. 60, f. 8, 1823. Pot., Mich. Gal. t. 27, f. 9, 10, 1838.
*Strombus costatus*, Schröter, Fluss. Conch. p. 373, t. 8, f. 14, 1779.
*Melania punctulata*, Grateloup, in Reeve, Conch. Icon. f. 100, 1859.
*Melania virgulata*, Ferussac, Quoy, Gaimard. Voy. Astrol. iii, p. 141, t. 56, f. 1—4, 1826–34. Reeve, Conch. Icon. f. 109, 1859.
*M. truncatula*, Lam., Quoy, Gaimard. (non Lamarck) Voy. Astrol. t. 56, f. 5—7, 1826–34.
*M. punctata*, Lam., Pot. Mich. (non Lamarck) Gal. t. 27, f. 15, 16, 1838.

*M. Layardi*, Dohrn, Proc. Zool. S. Lond. 1858, p. 135. Reeve, Conch. Icon. f. 104, 1859.
*M. beryllina*, Brot, Rev. Zool. 1860, t. 17, f. 8.
*M. Rothiana*, Mousson, Coq. Terr. Fluv. Palest. (Roth.) 1841, p. 61.
*M. rubropunctata*, Tristram, Proc. Zool. S. Lond. 1865, p. 541.
*Tijringen, Pardana, Java, Algeria, Alexandria, Coromandel, Mauritius, Ceylon, I. S. Anton., Pondicherry, Tiberias, Palestine.*

**247. M. unifasciata,** Mousson, Moll. Java, t. 11, f. 8, 1749.
*Melanoides unifasciata* (Mouss.), H. and A. Ad., Gen. of Rec. Moll., 1858. *Malang, Java.*

**248. M. Victoriæ,** Dohrn, Proc. Zool. S. Lond. 1865. *Victoria, Zambèsi.*

**249. M. Zengana,** Morelet, Sér. Conch. p. 115, t. 6, f. 9, 1860. *Zanzibar.*

§ 9.

(*Tarebia*, H. and A. Adams, 1858.)

**250. M. armillata,** Lea, Proc. Zool. S. Lond. 1850.
Brot, Mater. ii, t. 1, f. 12, 1868.
*Tarebia armillata* (Lea), H. and A. Ad., Gen. of Rec. Moll. 1858. *India, Java?*

**251. M. Baliensis,** Dunker MSS. (ubi?) *Lake Bator, Bali.*

**252. M. Celebensis,** Quoy, Gaimard. Voy. Astrol. t. 56, f. 26—29, 1826–34
Brot, Mater. ii, t. 1, f. 13, 1868.
*Tarebia Celebensis* (Q. G.), H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2014, 1859.
*Vibex Celebensis* (Q. G.), Gray, Guide Syst. Distr. 1857. *Célèbes, Ternate.*

**253. M. coffea,** Philippi, Abbildg. t. 2, f. 4, 1843.
*Tarebia coffea* (Phil.), H. and A. Ad., Gen. of Rec. Moll. 1858. *Java?*

**254. M. crebra,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 162, 1860.
*Tarebia crebrum* (Lea), H. and A. Ad., Gen. of Rec. Moll. 1858. *Guimaras, Philippines.*

**255. M. crenifera,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 169, 1860.
*Tarebia crenifera* (Lea), H. and A. Ad., Gen. of Rec. Moll. 1858. *Java.*

**256. M. granifera,** Lamarck, An. s. V. No. 13, 1822.
Quoy, Gaimard, Voy. Astrol. t. 56, f. 19, 1826–34. Encycl. Method. t. 458, f. 4, 1816. Pot., Mich. Gal. t. 27, f. 11, 12, 1838. Hanley, Conch. Misc. f. 13, 1854. Reeve, Conch. Icon. f. 225, 1860.
*Timor, Umata, Guam. (Marianne).*

**257. M. granospira,** Mousson, Journ. Conch. 1857, p. 161.
Brot, Mater, ii, t. 1, f. 10, 1868. *Java.*

**258. M. Helenæ,** Tryon, Proc. Ac. N. S. Phil. 1863, p. 146, t. 1, f. 7. *Philippines.*

**259. M. hybrida,** Reeve, Conch. Icon. f. 163, 1860.
*M. neutra,* Brot, Mater. i, p. 53, 1862.

**260. M. lateritia,** Lea, Proc. Zool. S. Lond. 1850.
Hanley, Conch. Misc. f. 56, 1857. Reeve, Conch. Icon. f. 164—166, 1860.
*Tarebia lateritia* (Lea), H. and A. Ad., Gen. of Rec. Moll, 1858. Chenu, Man. Conch. f. 2012, 1869. *Philippines.*

**261. M. lirata,** Benson (non Menke), Glean. Sc. 1830, ii.
Journ. As. Soc. Calcutta, 1836, v, 782. Reeve, Conch. Icon. f. 170, 1860.
*Helix lineata* (Gray), Wood, Ind. Test. f. 68, 1825.
*Melania lineata,* Troschel, Wiegm. Archiv. 1837, p. 176. Philippi, Abbildg. t. 3, f. 7, 1844. Mousson, Moll. Java, t. 10, f. 6, 1849.
*Tarebia lineata,* H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania semigranosa,* von dem Busch, Phil. Abbildg. t. 1, f. 13, 1842. Reeve, Conch. Icon. f. 167, 1860. Hanley, Conch. Misc. f. 12, 1854.
*Tarebia semigranosa* (v. d. B.), H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2013, 1859.
*Melania flavida,* Dunker, Phil. Abbildg. t. 3, f. 15, 1844. Mousson, Moll. Java, t. 10, f. 5, 1849.
*Tarebia flavida* (Dunk.), H. and A. Ad., Gen. of Rec. Moll. 1858. *Ganges, Pardana, Java.*

**262. M. Luzoniensis,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 171, 1860.
*Tarebia Luzoniensis* (Lea), H. and A. Ad., Gen. of Rec. Moll. 1858. *Calamang, Philippines.*

**263. M. Mauiensis,** Lea, Proc. Ac. N. S. Phil. 1856.
Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio, xi, t. 22, f. 19, 1866 (an = *granifera,* Lam. ?)
*Sandwich Isl.*

**264. M. Moluccensis,** Quoy, Gaimard, Voy. Astrol. t. 56, f. 22–25, 1826–34.
*Iuga Moluccensis*, (Q. G.) H. and A. Ad., Gen. of Rec. Moll. 1858, (non Reeve, Conch. Icon.) *Moluccas.*

**265. M. nana,** Lea, Proc. Zool. S. Lond. 1850.
Brot, Mater. ii, t. 1, f. 8, 1868.
*Sermyla nana*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. *I. Negros.*

**266. M. psorica,** Morelet, Journ. Conch. 1864, p. 287.
*Madagascar.*

**267. M. scopulus,** Reeve, Conch. Icon. f. 155, 1860.
*Philippines.*

**268. M. Tahitensis,** Pease, (non Dunker) MSS. Mus. von dem Busch, (ubi. ?), an = *M. Helenæ*, Tryon. ?)
*Taïti.*

**269. M. verrucosa,** Hinds, Ann. Mag. N. H. xiv, p. 9, 1844. Voy. Sulph. t. 15, f. 7, 8, 1843–45. Chenu, Ill. Conch. t. 2, f. 5, 16. Reeve, Conch. Icon. f. 168, 1860.
*Tarebia verrucosa*, (Hinds) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2010, 1859.
*New Ireland.*

§ 10.

(*Sermyla*, H. and A. Adams, 1858.)

**270. M. mitra,** Dunker, Phil. Abbildg. t. 3, f. 9, 1844.
*M. tornatella*, Lea, Proc. Zool. S. Lond. 1850. Hanley, Conch. Misc. f. 56, 1857. Reeve, Conch. Icon. f. 173, 1860.
*Sermyla tornatella*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1950, 1859.
*Melania Riquetii*, Reeve, (non Grateloup) Conch. Icon. Errata.
*Tanhay, Negros*, (*Philippines.*)

**271. M. Riquetii,** Grateloup, Mém. plus. esp. Moll. t. 3, f. 28, 1840.
Mousson, Moll. Java t. 11, f. 10, p. 76, (exclus. synon.) 1849, (non Reeve, Conch. Icon.)
*Tarebia Riquetii*, (Gratel.) H. and A. Ad., Gen. of Rec. Moll. 1858.
(*?*) *Melania triquetra*, Parreyss, MSS. (in Mouss. Moll. Java.)
*Melania harpula*, Dunker, Phil. Abbildg. t. 3, f. 6, 1844.
*Sermyla harpula*, (Dunk.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Bombay, ? Java ?*

**272. M. semicostata,** Philippi, Abbildg. t. 4, f. 12, 1847.
*Sermyla semicostata*, (Phil.) H. and A. Ad., Gen. of Rec. Moll. 1858.

**273. M. sculpta,** Souleyet, Voy. Bonite t. 31, f. 16–18, 1832. *Philippines.*

§ 11

(*Tiaropsis*, Brot.)

**274. M. Broti,** Dohrn, MSS. in Reeve Conch. Icon. f. 160, 1860.
*M. chocolatum*, Brot, Rev. Zool. 1860, t. 16, f. 2, (an = *M. rudis*, Lea, var. ?) *Ceylon.*

**275. M. collistricta,** Reeve, Conch. Icon. f. 158, 1860. *Philippines.*

**276. M. dura,** Reeve, Conch. Icon. f. 187, 1860.
(?) *M. strobilus*, Reeve, Conch. Icon. f. 214, 1860, (an = *M. Herklotzi*, Petit, var. ?) *Séville (? !)*

**277. M. Herklotzi,** Petit, Journ. Conch. 1853, t. 7, f. 10.
*Plotia Herklotzi*, (Petit) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania dimidiata*, Menke, Zeitsch. Mal. 1854, p. 28. *Java.*

**278. M. mirifica,** A. Adams, (Plotia) Proc. Zool. S. Lond. 1853, p. 99.
Reeve, Conch. Icon. f. 159, 1860.
*Plotia mirifica*, (Ad.) H. and A. Ad., Gen. of Rec. Moll. 1858. *New Ireland.*

**279. M. orientalis,** A. Adams, (Plotia) Proc. Zool. S. Lond. 1853, p. 99.
Reeve, Conch. Icon. f. 181, 1860.
*Tiara orientalis*, (Ad.) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania hippocastanum*, Brot, (non Reeve) Rev. Zool. 1860, t. 16, f. 1. *New Caledonia.*

**280. M. plumbea,** Brot, Journ. Conch. 1864, t. 2, f. 1.
var. *spinulis ornata*, coll. mea. *New Guinea.*

**281. M. rudis,** Lea, Proc Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 172, 1860.
*Tarebia rudis*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania microstoma*, Lea, Proc. Zool. S. Lond. 1850. Hanley, Conch. Misc. f. 58, 1857.

*Tarebia microstoma*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858.

var: *M. rudis*, *M. Broti affinis*, Brot, Mater. ii, t. 1, f. 7, 1868.

*Amboyna*, *I. Negros*, (*Philippines*), *Halmaeira*, (*Moluccas*) *Colombo*, (*Ceylon*).

**282. M. Winteri,** von dem Busch, Phil. Abbildg. t. 1, f. 1, 2, 1842.

Mousson, Moll. Java t. 12, f. 1, 1849. Hanley, Conch. Misc. f. 19, 1854. Reeve, Conch. Icon. f. 157, 1860.

*Plotia Winteri*, (v. d. B.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1945, 1859. *Java.*

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**283. (?) M. hippocastanum,** Reeve, Conch. Icon. f. 188, 1850. *Borneo.*

§ 12.

(*Tiara*, (Bolten) H. and A. Adams, 1858.)

**284. M. amarula,** Linné, (Helix) Syst. Nat. xii, p. 1249, No. 702, 1767.

Lamarck, An. s. V. No. 10, 1822. Encycl. Method. t. 458, f. 6, a, b, 1816. Chenu, Leçons. Elem. Conch. f. 928, 1847. Reeve, Conch. Icon. f. 177, 1860.

*Tiara amarula*, (L.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1941, 1859.

*I. de France*, *Madagascar*, *Mauritius.*

**285. M. cornuta,** Lea, Proc. Zool. S. Lond. 1850.

Reeve, Conch. Icon. f. 176, 1860.

*Tiara cornuta*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. *Madagascar.*

**286. M. crenularis,** Deshayes, Mag. Zool. 1844, t. 83.

*Tiara crenularis*, (Desh.) H. and A. Ad., Gen. of Rec. Moll. *Philippines.*

**287. M. diadema,** Lea, Proc. Zool. S. Lond. 1850.

Reeve, Conch. Icon. f. 174, 1860.

*Tiara diadema*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. *Guimaras Philippines.*

**288. M. mitra,** Meuschen, (Helix) Mus. Gronov. p. 128, No. 1363, 1778.

Reeve, Conch. Icon. f. 175, (1860), (exclus. synon.)

*M. Cybele*, Gould, Proc. Bost. S. N. H. 1847. Exped. Shells f. 154, 1852.

*Tiara Cybele*, (Gould) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Point Palmas*, (*Sumatra*), *Navigators*, *Feejee Isl.*

**289. M. Moreleti,** Deshayes, (non Reeve) Traité Elém. Conch. t. 74, f. 13, 1839.

**290. M. thiarella,** Lamarck, An. s. V. No. 11, 1822.
*Helix mitra*, Schröter, Fluss. Conch. t. 9, f. 12, 1779.
*M. thiarella*, (Lam.) Pot. Mich. Gal. t. 27, f. 19, 20, 1838.
*Tiara thiarella*, Brot, Mater. ii, t. 3, f. 10, 1868. (Lam.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1939, 1859.

**291. M. villosa,** Philippi, Zeitsch. Mal. 1848, p. 154.
Gassies, Faun. Nov. Caled. t. 4, f. 7, 1863.
*Tiara villosa*, (Phil.) H. and A. Ad., Gen. of Rec. Moll. 1858. *New Caledonia.*

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**292. M. setigera,** Brot.
*Melania setosa*, Swainson, var. in Reeve Conch. Icon. f. 185, 1860. *Guimaras*, *Negros*, (*Philippines.*)

**293. M. setosa,** Swainson, Quarterly Journ. Sc. 1824.
Zool. Ill. t. 7, f. 7, 8, 1820–33. Gray, Zool. Journ. i, t. 8, f. 6–8, 1825. Lesson, Voy. Coquille t. 11, f. 2, g. n., 1830. Philippi, Abbildg. t. 3, f. 10, 1844. Chenu, Leçons Elém. Conch. t. 5, f. 4; fig. 929, (text), 1847. Reeve, Conch. Icon. f. 186, 1860, (non Quoy, Gaimard, Voy. Astrol.)
*Buccinum aculeatum*, Lister, Hist. Conch. t. 1055, f. 8, 1692, Gualtieri, Ind. t. 6, f. B, 1742. Favanne, t. 61, f. G. 5, 1780.
*Tiara setosa*, (Swain.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1940, 1859.
Var. *Minor.* { *M. setosula*, Mousson, MSS. (Mus. Mousson.) / *M. Baliensis*, Mousson, MSS. (non Dunker) (Mus. Mousson).
*Waigiou, New Guinea; Point Palmas, Sumatra; Amboyna: Bali I.*

**294. M. speciosa,** A. Adams, (Tiara) Proc. Zool. S. Lond. 1853.
Reeve, Conch. Icon. f. 184, 1860.
*Tiara speciosa*, (A. Ad.) H. and A. Ad., Gen. of Rec. Moll. 1858. *New Caledonia.*

§ 13.

(*Plotia* (Bolten) H. and A. Adams, 1858.)

**295. M. bellicosa,** Hinds, Ann. Mag. N. H. xiv, p. 11, 1844. Voy. Sulph. t. 15, f. 15, 16, 1843—45. Chenu, Ill. Conch. t. 2, f. 10.

*Plotia bellicosa*, (Hinds) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1947, 1859.

*Melania pugilis*, Reeve, (non Hinds) Conch. Icon. f. 180, 1860.

*M. acanthica*, Lea, Proc. Zool. S. Lond. 1850. Hanley, Conch. Misc. f. 8, 1854.

*Tiara acanthica*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858.

*Melania rudicosta*, Mousson, MSS. (Mus. Mousson).

**296. M. cochlea,** Lea, Proc. Zool. S. Lond. 1850.
*Feejee Isl.; Manilla, Negros* (*Philippines*); *Amboyna.*

**297. M. corolla,** (Gould) Reeve, Conch. Icon. f. 366, 1860. (non Gould).
(An status juvenilis sp. cuj. ?)

**298. M. datura,** Dohrn, Proc. Zool. S. Lond. 1858, p. 135. Reeve, Conch. Icon. f. 213, 1860. *Ceylon.*

**299. M. furfurosa,** Gould, Proc. Bost. S. N. H. 1847. Exped. Shells, t. 10, f. 162, 1852, (an = *M. spinulosa*, Lam. ?) *Manilla.*

**300. M. granum,** von dem Busch, Phil. Abbildg. t. 1, f. 7, 1842.
Mousson, Moll. Java t. 12, f, 3, 4, 1849. Reeve, Conch. Icon. f. 219, 1860.

*Plotia granum*, (von dem Busch) H. and A. Ad., Gen. of Rec. Moll. 1858. *Java.*

**301. M. myurus,** Brot, Rev. Zool. 1860, t. 16, f. 3.

**302. M. pagoda,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 182, 1860.

*Tiara pagoda*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858. *Guimaras.*

**303. M. pugilis,** Hinds, (non Reeve) Ann. Mag. N. H. xiv, p. 10, 1844.
Voy. Sulph. t. 15, f. 17, 18, 1843—45. Chenu, Ill. Conch. t. 2, f. 8.

*Plotia pugilis*, (Hinds) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1944, 1859. *New Ireland.*

**304. M. scabrella,** Philippi, Abbildg. t. 4, f. 13, 1847.
Mousson, Moll. Java t. 12, f. 2, 1849.
*Plotia scabrella*, (Phil.) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania nodosa*, Parreyss, MSS. *Java.*

**305. M. spinescens,** Lesson, Voy. Coquille ii, p. 353, 1829. *New Guinea.*

**306. M. spinulosa,** Lamarck, An. s. V. No. 12, 1822.
Quoy, Gaimard, Voy. Astrol. t. 56, f. 12—14, 1826—34. Pot. Mich. Gal. t. 27, f. 17, 18, 1838. Delessert, Rec. Coq. t. 30, f. 15, 1841. Chenu, Ill. Conch. t. 2, f. 26. Philippi Abbildg. t. 1, f. 20, 1842. Mousson, Moll. Java t. 11, f. 11, 1849. Hanley, Conch. Misc. f. 20, 1854. (?) Reeve, Conch. Icon. f. 156, 1860. Brot, Mater. ii, t. 3, f. 8; t. 2, f. 6, 1868.
*Plotia spinulosa*, (Lam.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1493, 1859.
*Helix aspera*, Gmelin, 3656, in Wood. Ind. test. f. 141, 1825.
*Melania turrita*, Parreyss MSS.
*Buccinum scabrum*, (Müller) Schröter, Fluss. Conch. t. 6, f. 13, 1779.
*Helix scabra*, Chemnitz, Conch. t. 136, f. 1259, 1260, 1786.
*Melania scabra*, (Ferussac) Deshayes, in Lam. An. s. V. No. 35, 1838. ? Reeve, Conch. Icon. f. 183, 1860.
*Plotia scabra*, (Lam.) H. and A. Ad., Gen. of Rec. Moll. 1868.
*Melania denticulata*, Lea, Proc. Zool. S. Lond. 1850. Reeve, Conch. Icon. f. 211, 1860.
*Tiara denticulata*, (Lea) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania elegans*, Benson, MSS. Mus. Cuming. Reeve, Conch. Icon. f. 178, 1860.
*Plotia elegans*, (Benson) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Timor, Vanikoro, Lake Tirir, East Java; Solomon's Isl., Ceylon, Halmœira, Mauritius, Seychelles, I. Negros, Afghanistan.*

**307. M. tetrica,** Gould, (non Conrad) Proc. Bost. S. N. H. 1847.
Exped. Shells, t. 9, f. 153, 1852.
*Plotia tetrica*, (Gould) H. and A. Ad., Gen. of Rec. Moll. 1858.
*M. Feejeensis*, Reeve, Conch. Icon. f. 179, 1860. *Feejee Isl.*

**308. M. Terpsichore,** Gould, Proc. Bost. S. N. H. 1847. Exped. Shells, t. 9, f. 155, 1852.
*Plotia Terpsichore*, (Gould) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania Oualanensis*, Pease, Am. Journ. Conch. ii, t. 20, f. 4, 1866.
*M. Ovalanensis*, Mousson, MSS. Olim. Catal. Godeffroy.
*Ovalan* (*Feejee Isl.*)

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**309. M. australis,** Lea, Proc. Zool. S. Lond. 1850.
Reeve, Conch. Icon. f. 82, 1859.
*M. decussata*, Brot, Mater. i, p. 55, 1862.
*Victoria Riv.* (*N. Australia.*)

**310. M. Balonnensis,** Conrad, Proc. Ac. N. S. Phil. 1850, p. 11.
Am. Journ. Conch. ii, t. 1, f. 10, 1865.
*M. tetrica*, Conrad, (non Gould) Proc. Ac. N. S. Phil. 1850, p. 11. Am. Journ. Conch. ii, t. 1, f. 9, 1865.
*Balonne Riv.* (*Australia*) ; *Wide Bay, Clarence Riv.* (*Australia*).

**311. M. cerea,** Brot, Rev. Zool. 1860, t. 17, f. 13.
(An = *M. australis*, Lea ?) *Australia.*

**312. M. incerta,** Brot, Mater. i, p. 52, 1862.
*M. lirata*, Menke, (non Benson) Moll. Nov. Holl. No. 21, 1843. *Australia.*

**313. M. Onca,** Adams et Angas, Proc. Zool. S. Lond. 1863.
*Adelaide Riv.* (*Australia.*)

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*Melaniæ ignotæ vel incertæ sedis.*

*M. æthiops*, Beck, Lea Catal. Melan.
*M. aspera*, Lesson, Voy. Coquille ii, p. 357. New Guinea.
*M. aspersa*, Cristoforis Jan. Catal coll. South America.
*M. Carolinæ*, Gray, Lea, Catal. Melan.
*M. conus*, Jacquin, (Hemisinus) H. and A. Ad., Gen. of Rec. Moll.
*M. dolorosa*, Gould, Proc. Bost. S. N. H. vii, 1859. Hakodadi (Japan.)
*M. costula*, Rafinesque, Atl. Journ. and Friend of Knowl. v, 1833. Ganges.
*M. eburnea*, Mühlfeld, Lea's Catal. Mel.
*M. erodes*, Ziegler, Lea's Catal. Mel.
*M. fluminalis*, Mühlfeld, id.

*M. gibbosa*, Rafinesque.
*M. glabrata*, Mühlfeld, Lea's Catal. Melan.
*M. hians*, Lea, H. and A. Ad. Gen. of Rec. Moll. 1858.
*M. inæquata*, Fischer, d. Waldheim, Lea's Catal. Mel.
*M. inermis*, Gray, Lea's Catal. Melan.
*M. inermis*, Sowerby.
*M. libertina*, Gould, Proc. Bost. S. N. H. vii, 1859. Simoda, Ousina, China.
*M. ligata*, Cristoforis, Jan. Catal. Coll. South America.
*M. maculata*, Parreyss, Lea's Catal. Melan.
*M. ochracea*, Cristoforis, Jan. Catal. Coll. Martinique.
*M. plicata*, Menke, Syn. Meth. p. 137.
*M. portalis*, Rossmässler, Lea, Catal. Mel.
*M. pygmæa*, Hoch., Desh., id.
*M. soluta*, Philippi, id.
*M. spinigera*, Lea, id.
*M. subcarinata*, Gray, id.
*M. subulata*, Sowerby, Man. Conch. f. 312.
*M. sulculata*, Mawe (Helix), Wood, Ind. Test. f. 73.
*M. tenuis* (Lea), Plotia, H. and A. Ad., Gen. of Rec. Moll.
*M. terebella*, Mühlfeld, Lea, Catal. Melan.
*M. tessula*, Rafinesque, Atl. Journ. and Friend of Knowl. v, 1833. Bengal.
*M. tuberculata*, von dem Busch, Lea, Catal. Mel.

## Genus **DORYSSA**, H. and A. Adams.

1. **D. aspersa**, Reeve.
*Melania aspersa*, Reeve, Conch. Icon. f. 325, 1860.
*M. tigrina*, Brot, Mater. i, p. 45, 1862. *Pernambuco.*

2. **D. atra**, Richard.
*Bulimus ater*, Richard, Act. S. H. N. Paris, p. 126, No. 18, 1792.
*Melania atra* (Desh.), D'Orbigny, Dict. Univ. t. 12, f. 1, 2 (non Reeve, Conch. Icon., nec Philippi, Abbildg.)
*Aylacostoma atra* (Rich.), Mörch., Catal. p. 56.
*Pachychilus ater* (Desh.), Troschel, Gebiss. d. Schneck. 1857.
*Murex decollatus* (Linnè), Syst. Nat. xii, No. 578, 1767. Wood, Ind. Test. f. 169, 1825 (non *M. decollata*, Lam., nec Chemnitz).
*Melania truncata*, Lamarck, An. s. V. No. 2, 1822. Chenu, Man. Conch. f. 1989, 1859.
*Melania semiplicata*, Encycl. Méth. t. 458, f. 3 a, b, 1816.
*Melania Nicotiana*, Reeve, Conch. Icon. f. 202, 1860.
*Guyana, Brazil.*

**3. D. brevior,** Troschel.

*Melania brevior*, Troschel, Schomb. Reise Brit. Guyana, iii, p. 550, 1848. Phil., Abbildg. t. 5, f. 4, 1848. Hanley, Conch. Misc. f. 5, 1854. Reeve, Conch. Icon. f. 197, 1860. *Rio Branca, Guyana.*

**4. D. bullata,** Lea.

*Melania bullata*, Lea, Proc. Ac. N. S. Phil. 1856. Journ. Ac. N. S. Phil. vi, n. s. Lea, Observ. Gen. Unio, xi, t. 22, f. 29, 1866.

*M. ventricosa*, J. Moricand, Journ. Conch. 1856, t. 6, f. 6.

*M. Batesii*, Reeve, Conch. Icon. f. 203, 1860.

*Brazil, Macapa, mouth of Amazon.*

**5. D. chloris,** Troschel.

*Melania chloris*, Troschel, Schomb. Reise. Brit. Guyana, iii, p. 545, 1848. *Guyana.*

**6. D. circumsulcata,** von dem Busch.

*Melania circumsulcata*, v. d. Busch, Mal. Blätt, 1858, p. 35 (non Gassies). Reeve, Conch. Icon. f. 201, 1860.

*Helix decollata*, Chemnitz, ix, f. 1258, 1786.

*Bulimus consolidatus*, Bruguiere, Encycl. No. 48, 1792.

*Helix consolidata*, Wood, Ind. Test. f. 134, 1825.

*Melania decollata*, Lea, fide von dem Busch (non Linnè, nec Lamarck). *Pallo (?), Maranon, Surinam.*

**7. D. Hohenackeri,** Philippi.

*Melania Hohenackeri*, Philippi, Zeitsch. Mal. 1851, p. 82. *Surinam.*

**8. D. Lamarckiana,** Brot.

*Melania atra* (Richard), Reeve, Conch. Icon. f. 195 a, b, 1860. Philippi, Abbildg. t. 5, f. 2, 1848.

*Burmah (?), Esequibo Riv. (Guyana).*

**9. D. Macapa,** J. Moricand.

*Melania Macapa*, J. Moricand, Journ. Conch. 1856, t. 6, f. 7. Reeve, Conch. Icon. f. 194, 1860.

*M. aquatilis*, Reeve, Conch. Icon. f. 73, 1859, 193, 1860.

*M. Charpentieri*, Dunker MSS. (Mus. Cuming.) (haud adulta). Reeve, Conch. Icon. f. 76, 1859. *Macapa, Rio Branca.*

**10. D. millepunctata,** Tryon.

*Melania millepunctata*, Tryon, Am. Journ. Conch. i, t. 22, f. 3, 1865.

*Melania Krantzii*, Charpentier MSS. (coll. Mousson).

*Amazon.*

**11. (?) D. obruta,** Lea.

*Melania obruta*, Lea, Proc. Zool. S. Lond. 1850.

**12. D. petechialis,** Brot.
*Melania petechialis*, Brot, Rev. Zool. 1860, t.17, f. 10.

**13. (?) D. rubida,** Lea.
*Melania rubida*, Lea, Proc. Ac. N. S. Phil. 1856. Journ. Ac. N. S. Phil. vi, n. s. Lea, Obs. Gen. Unio, xi, t. 22, f. 16, 1866. *Mexico.*

**14. D. transversa,** Lea.
*Melania transversa*, Lea, Proc. Zool. S. Lond. 1850. Reeve, Conch. Icon. f. 196, 1860. *Guyana.*

## Genus **VIBEX,** Oken, 1815.

**1. V. auritus,** Müller, (Nerita) Verm. p. 192, No. 379, 1773.
*Bulimus auritus*, Bruguiere, Encycl. Method. No. 58, 1792.
*Strombus auritus*, Gmelin, No. 43, 1788–93. (Gray) Wood, Ind. Test. Suppl. t. 4, f. 22, 1828.
*Strombus tympanorum*, Chem., t. 136, f. 1265, 1266, 1786.
*? Melania tympanotonos*, Desh., Encycl. Méth. No. 12.
*Melania aurita*, Ferussac, Syst. Conch. p. 73, No. 4, 1807. Rang, Mag. Conch. pl. 12, 1830. Reeve, Conch. Icon. f. 190, 1860.
*Pirena aurita*, Lamarck, An. s. V. No. 3, 1822. Chenu, Le . Elem. Conch. t. 5, f. 1, 1847.
*Vibex auritus*, (Müller) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2004, 1859. *Sénégal.*

**2. V. balteatus,** Philippi.
*Melania balteata*, Philippi, Abbildg. Register des Bd. iii (non Reeve).
*Vibex balteata* (Phil.), H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania zonata*, Philippi, Abbildg. t. 5, f. 5 (non von dem Busch nec Benson), (an = *V. granulosus*, Lam.?) 1848. *Sénégal.*

**3. V. Byronensis,** Gray (Strombus), Wood, Ind. Test. Suppl. t. 4, f. 23, 1828.
*Melania Byronensis*, Gray, Encycl. Metropol. Moll. t. 21. Hanley, Conch. Misc. f. 14, 1854.
*Vibex Byronensis* (Gray), Chenu, Man. Conch. f. 2006, 1859.
*Melania Owensiana*, Gray, Zool. Misc. 1831.
*Melania Oweniana* (Gray), Wood, Ind. Test. Suppl. p. 216, 1828.
*Vibex Owenii* (Gray), Chenu, Man. Conch. f. 2005, 1859. Gray, Guide Syst. Distrib. 1857.

*Melania tuberculosa*, Rang, Mag. Zool, 1832, t. 13. Reeve, Conch. Icon. f. 191, 1860.
*Vibex tuberculosa* (Rang), H. and A. Ad. Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2007, 1859.
*Melania Rangii*, Deshayes, in Lamarck, An. s. V. No. 34, 1838. *Sénégal.*

**4. V. fastigiella,** Reeve.
*Melania fastigiella*, Reeve, Conch. Icon. f. 189, 1860.

**5. V. fuscus,** Gmelin (Murex), p. 3561, No. 139, 1788–93. Lister, Conch. t. 120, f. 15, 1692.
*Murex fuscatus*, Maton Rackett, Catal. Test. Brit. in Trans. Lin. Soc. (Edit. Chenu,) p. 187, t. 17, f. 6, 1804.
*Melania Matoni*, Gray, Zool. Misc. 1831. Hanley, Conch. Misc. f. 1, 1854.
*Melania Listeri*, Anton (ubi ?)
*Melania fusca* (Gmel.), Philippi, Abbildg. t. 2, f. 1, 1843. Reeve, Conch. Icon. f. 200, 1860.
*Vibex fusca* (Gmel.), H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2008, 1859. *Sénégal.*

**6. V. granulosus,** Lamarck.
*Pirena granulosa*, Lamarck, An. s. V. No. 4, 1822. Delessert, Rec. Coq. t. 31, f. 1 a, b, 1841 (non Chenu, Man. Conch.)

**7. V. histrionicus,** Reeve.
*Melania histrionica*, Reeve, Conch. Icon. f. 192, 1860.
*Hemisinus histrionicus* (Reeve), Brot, Mater. i, p. 61, 1862. *Cape Colony.*

**8. V. quadriseriatus,** Gray.
*Melania quadriseriata*, Gray, Zool. Misc. 1831. Hanley, Conch. Misc. f. 9, 1854.
*Tarebia quadriseriata* (Gray), H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2011, 1859.
*Melania tessellata*, Lea, Proc. Zool. S. Lond. 1850. Brot, Mater. ii, t. 1, f. 4, 5, 1868.
*Tarebia tessellata* (Lea), H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania loricata*, Reeve, Conch. Icon. f. 198, 1860.
*Melania mutans*, Gould, Proc. Bost. S. N. H. 1843. Reeve, Conch. Icon. f. 215, 1860.
*Doryssa mutans* (Gould), H. and A. Ad., Gen. of Rec. Moll. 1858. *Gaboon.*

**9. V. soriculatus,** Morelet (Melania), Journ. Conch. 1864, p. 287. *Grand Bassan.*

## Genus **PIRENA**, Lamarck, 1812.

Extrait du Cours, 1812. An. s. V. 1822.

§ 1.

(*Faunus*, Montfort, 1810).

**1. P. atra**, Linné (Strombus), Syst. Nat. xii, p. 1213, No. 516, 1767.

*Nerita atra*, Müller, Verm. No. 375, 1773. Schröter, Fluss. Conch. p. 371, 1779.

*Strombus atropurpureus*, Schröter, Fluss. Conch. p. 372, 1779.

*Strombus dealbatus*, Gmelin, No. 46, p. 3523, 1778–93.

*Strombus ater*, Chemnitz, t. 135, f. 1227, 1786.

*Cerithium fluviatile*, Ferussac, Syst. Conch. p. 69, No. 1, 1807.

*Melanamona*, Bowdich, Elem. Conch. t. 6, f. 19, 1822.

*Pirena atra* (Linné),Mousson, Moll. Java, t. 10, f. 1, 1849. Reeve, Conch. Icon. f. 5, 1859.

*Faunus ater* (Linné), H. and A. Ad., Gen. of Rec. Moll. 1858. Gray, Guide Syst. Distrib. 1857. Chenu, Man. Conch. f. 2080, 1859.

*Melanopsis atra* (Linné), Ferussac, Monog. Melanops. t. 2, f. 7, p. 32, 1823. Sowerby, Gen. of Shells, f. 1, 1820–24. Deshayes, Encycl. Method. Verm. ii, p. 337, No. 11.

*Pirena terebralis*, Lamarck, An. s. V. No. 1, 1822. Quoy, Gaimard, Voy. Astrol. t. 56, f. 40—42, 1826–34. Lesson, Voy. Coquille, ii, p. 360, 1829. Sowerby, Conch. Man. f. 316, 1839.

*Pirena picta*, Reeve, Conch. Icon. f. 3, 1859.

*Status juvenilis.*
- *Buccinum acicula*, Gmelin, p. 3503, 1788–93.
- *Pirena acus*, Lesson, Voy. Coquille, ii, p. 360, 1829.
- *Melanopsis princeps*, Lea, Trans. Am. Phil. S. Phil. v, t. 19, f. 74.
- *Faunopsis princeps* (Lea), Gill, Proc. Ac. N. S. Phil. 1863.

*Monstrosa*: *Pirena pagodus*, Reeve, Conch. Icon. f. 4, 1859.

*Java*, *Philippines*, *Moluccas*, *Ceylon* (Humbert), *Amboyna*, *I. Bourbon*, *New Guinea*.

**2. P. Cantori**, Reeve, Conch. Icon. f. 2, 1859 *Penang.*

**3. P. nana**, Reeve, Conch. Icon, f. 1, 1859. *New Caledonia.*

**4. P. nitida**, von dem Busch, Malac. Blätt. 1858, p. 36 (an = *P. atra*, L?) *Philippines.*

§ 2.

(*Melanatria*, Bowdich, 1822.)

**5. P. Cecillei,** Philippi, Zeitsch. Mal. 1849, p. 28.

**6. P. Duisabonis,** Grateloup.
*Melania Duisabonis*, Grateloup, Mém. plus. esp. Coq. p. 46, t. 4, f. 8, 1840.
*Melania bicarinata*, Grateloup, ibid. t. 4, f.9, (*monstrosa*).
*Madagascar.*

**7. P. fluminea,** Gmelin (Buccinum), p. 3603, 1788–93.
Reeve, Conch. Icon. f. 10, 1859.
*Melanatria fluminea* (Gmel.), Gray, Guide Syst. Distrib. 1857. H. and A. Ad., Gen. of Rec. Moll. 1858.

**8. P. Lamarckii,** Valenciennes MSS. Mus. Paris.
*Melanopsis Lamarckii* (Valenc.), in Pot. Mich. Gal. t. 31, f. 5, 6, 1838.
*Potamides Lamarckii* (Valenc.), H. and A. Ad., Gen. of Rec. Moll. 1858. *Madagascar ?*

**9. P. lingulata,** Reeve, Conch. Icon. f. 7, 1859.
*West Africa.*

**10. Madagascariensis,** Grateloup, (non Encyclop.)
*Melania Madagascariensis*, Grateloup, Mém. plus esp. Coq. 1840, t. 4, f. 7.
*? Pyrene de Madagascar*, Blainville, Malac. t. 21, f. 22, 1825–27. *Madagascar.*

**11. P. maura,** Reeve, Conch. Icon. f. 6, 1859.
*Pirena Debeauxiana*, Crosse, Journ. Conch. 1862, t. 13, f. 6.
*West Africa.*

**12. (?) P. pirenoides,,** Reeve.
*Melania pirenoides*, Reeve, Conch. Icon. f. 128, 1860.
*Fernando Po.*

**13. P. plicata,** Reeve, Conch. Icon. f. 11, 1859.
*Melania subimbricata*, Philippi, Abbildg. t. 5, f. 3, 1848 (haud adulta). Reeve, Conch. Icon. f. 199, 1860.
*Melania fraterna*, Lea, Proc. Ac. N. S. Phil. 1856. Journ. Ac. N. S. Phil. vi, n. s. Lea, Observ. Gen. Unio, xi, t. 22, f. 28, 1866.
*Pirena granulosa* (Lam.),Chenu, Man. Conch. f. 2081 (non Lamarck), 1859.

**14. P. sinuosa,** Philippi, Zeitsch. Mal. 1851, p. 91.

**15. P. spinosa,** Lamarck, An. s. V. No. 2, 1822.
Deshayes, Traité Elém. Conch. t. 75, f. 1, 2, 1839. Reeve, Conch. Icon. f. 9, 1859.
*Melanatria spinosa* (Lamarck), Chenu, Man. Conch. f. 2082, 1859.
*Pirena Madagascariensis*, Encyclop. t. 458, f. 2 (non Grateloup), (an = *P. fluminea*, Gm. var.?) *Madagascar.*

Genus **HEMISINUS,** Swainson.
Treat. on Malacol. 1840.

**1. H. acicularis,** Ferussac.
*Melanopsis acicularis*, Ferussac, Monogr. Melanops. p. 31, 1823. Rossmässler, Icon. f. 672, 1839. H. and A. Ad., Gen. of Rec. Moll. 1858.
*Melania acicularis*, (Pfeiffer) Reeve, Conch. Icon. f. 209, 1860.
*Melanopsis Daudebartii*, Prevost, Bull. Sc. Soc. Philom. 1821.
*Melanopsis Audebartii*, Prevost, Mém. Soc. H. N. Paris i, p. 259, 1823.
*Melanopsis Audebardi*, (Prév.) Rossm., Icon. f. 673-675, 1839.
*Melanopsis pyramidalis*, Lang, Isis. 1833, p. 430.
*Melanopsis cornea*, Mühlfeld, MSS. (ubi?)
*Melanopsis aciculella*, Ziegler, MSS. in Pot. Mich. Gal. t. 31, f. 3, 4, 1838.
*Melanopsis Lembergensis*, Schröder, (fide Parreyss.) ubi? *Laybach, Vösslau, Lemberg (Galicia) Carniola.*

**2. H. Behnii,** Reeve, Conch. Icon. f. 8, 1860. *Pernambuco.*

**3. H. bicinctus,** Reeve, Conch. Icon. f. 2, 1860.
*Melania cingulata*, J. Moricand, Journ. Conch. 1860, t. 12, f. 6. *Brazil.*

**4. H. Brasiliensis,** J. Moricand.
*Melanopsis Brasiliensis*, J. Moricand, Mém. Soc. Phys. Genèv. viii, t. 3, f. 12, 13, 1837.
*Melania Brasiliensis*, (Moric.) Phil., Abbildg. t. 4, f. 1, 1847. T. Moricand, Journ. Conch. 1860, t. 12, f. 7.
*Hemisinus Brasiliensis*, (Moric.) H. and A. Ad., Gen. of Rec. Moll. 1858. Reeve, Conch, Icon. f. 5, 1860.
*Melania scalaris*, (?) var. Wagner, Spix. test. Brasil t. 8, f. 5, 1827.
*Aylacostoma scalaris*, (Wagn.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1966, 1859. *Brazil.*

**5. H. buccinoides,** Reeve, Conch. Icon. f. 3, 1860.
*Jamaica ?*

**6. H. Cambojensis,** Reeve.
*Melania Cambojensis*, Reeve, Conch. Icon. f. 468, 1861. Mabille, Journ. Conch. 1866, t. 7, f. 2. *Cambodia.*

**7. H. contractus,** Lea.
*Melania contracta*, Lea, Proc. Zool. S. Lond. 1850.
*Hemisinus contractus*, (Lea) Reeve, Conch. Icon. f. 19, 1860. H. and A. Ad., Gen. of Rec. Moll. 1858. *Seychelles.*

**8. H. crenocarina,** J. Moricand.
*Melanopsis crenocarina*, J. Moricand, Mém. Soc. Phys. Genèv. ix, p. 61, t. 4, f. 10, 11, 1838.
*Melania crenocarina*, (Moric.) Phil., Abbildg. t. 4, f. 14, 1847. Hupé, Voy. Castelnau t. 13, f. 6, 1857.
*Verena crenocarina*, (Moric.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2055, 1859.
*Hemisinus crenocarina*, (Moric.) Reeve, Conch. Icon. f. 16, 1860.
*Melania cingulata*, Jonas, (non J. Moricand) Zeitsch. Mal. 1844, p. 51. *Brazil.*

**9. H. Cubanianus,** d'Orbigny.
*Melania Cubaniana*, d'Orbigny, Hist. Nat. Cuba t. 10, f. 16, 1845. Reeve, Conch. Icon. f. 358, 1860.
(?) *Melania pallida*, Gundlach, Poey's Memor. ii, p. 16, t. 1, f. 15, 1856. Pfeiffer, Mal. Blätt. 1856, p. 42. *Cuba.*

**10. H. dermestoideus,** Lea.
*Melania dermestoidea*, Lea, Proc. Zool. S. Lond. 1850.
*Hemisinus dermestoideus*, (Lea) H. and A. Ad., Gen of Rec. Moll. 1858. Reeve, Conch. Icon. f. 9, 1860. *Seychelles.*

**11. H. Edwarsii,** Lea.
*Basistoma Edwarsii*, Lea, Obs. Gen. Unio v, t. 30, f. 1, 1852.
*Hemisinus Edwarsii*, (Lea) Reeve, Conch. Icon. f. 7, 1860. Reeve, Monogr. Pirena f. 8, 1860. *Pernambuco.*

**12. H. Esperi,** Ferussac, (Melanopsis) Monogr. Melanops. p. 31, 1823. Reeve, Conch. Icon. f. 14, 1860.
*Melanopsis Esperi*, (Fer.) Blainv., Fauna Franç. t. 7, f. 7, 1820—30. H. and A. Ad., Gen. of Rec. Moll. 1858. Rossm. Icon. f. 668—671, 1839.
*Melanopsis pardalis*, Urhlfeld, MSS.
*Melanopsis decussata*, Ferussac, Monogr. Melanops. p. 30, 1823.
*Melanopsis picta*, Lang, in Menke Synops.
*Laybach, Plattensee, S. E. Austria.*

**13. H. Guayaquilensis,** Petit.
*Melania Guayaquilensis*, Petit, Journ. Conch. 1853, t. 5, f. 6.
*Hemisinus Guayaquilensis*, (Petit) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1996, 1859. Reeve, Conch. Icon. f. 23, 1860.
*Melanopsis elatior*, Parreyss, MSS. *Guayaquil.*

**14. H. Kochii,** Bernardi, (Melania) Journ. Conch. 1856, p. 83, t. 3, f. 6. Reeve, Conch. Icon. f. 21, 1860. *Brazil.*

**15. H. lineolatus,** (Strombus) Gray, MSS. in Wood Ind. test. Supplém. f. 11, 1828. Griffith, Cuv. t. 13, f. 4, 1824—33. Reeve, Conch. Icon. f. 4, 1860. H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 1995, 1859.
*Melania lineolata*, (Wood) Phil., Abbildg. t. 6, f. 10, 1848.
*Melanopsis lineolata*, (Gray) Hanl., Conch. Misc. f. 29, 1854.
*Venezeula, Jamaica.*

**16. H. obesus,** Reeve, Conch. Icon. f. 17, 1860. *Brazil.*

**17. H. olivaceus,** Behn, MSS. in Reeve Conch. Icon. f. 12, 1860. *Pernambuco.*

**18. H. ornatus,** (Melania) Poey, Mèmor. p. 422, t. 33, f. 5, 6, 1854.
Reeve, Conch. Icon. f. 20, 1860. *Cuba.*

**19. H. Osculati,** Villa.
*Melania Osculati*, Villa, Giorn. Mal. 1854, viii, p. 113. Notiz, int. Gen. Mel. 1855.
*Hemisinus Osculati*, (Villa) Brot, Mater. ii, t. 2, f. 9, 1868.
*Melania fuscopunctata*, von dem Busch, Proc. Zool. S. Lond. 1859.
*Hemisinus aspersus*, Reeve, Conch. Icon. f. 10, 1860.
*Hemisinus Binneyii*, Tryon, Am. Journ. Conch. ii, t. 2, f. 8.
(*?*) *Melanopsis maculata*, Lea, Trans. Am. Phil. S. v. t. 19, f. 75, 1837.
*Quito, Ecuador, Brazil, New Granada, Peru.*

**20. H. Pazi,** Tryon, Am. Journ. Conch. ii, t. 20, f. 6, 1866. *Quito.*

**21. H. pulcher,** Reeve, Conch. Icon. f. 15, a, b, 1860. *Pernambuco.*

**22. H. punctatus,** Reeve, Conch. Icon. f. 1, 1860. *Pernambuco.*

**23. H. ruginosus,** Morelet.
*Melania ruginosa*, Morelet, Test. Nov. Cuba 1, p. 25, 1849.

*Hemisinus ruginosus*, Behn., MSS. in Reeve, Conch. Icon. f. 13, 1860.
*H. zoster*, Brot, Mater. i, p. 62, 1862.
*Melania Patenensis*, Tristram, Proc. Zool. S. Lond. 1863.
(?) *Hemisinus ruginosus*, (Lea) H. and A. Ad., Gen of Rec. Moll. 1858. *Yzabal, Brazil, L. Peten, Vera Paz.*

**24. H. simplex,** Tryon, Am. Journ. Conch. ii, t. 20, f. 7, 1866. *Quito.*

**25. H. strigillatus,** Dunker.
*Melania strigillata*, Dunker, Phil. Abbildg. t. 2, f. 14, 1843.
*Hemisinus strigillatus*, (Dunk.) Reeve, Conch. Icon. f. 11, 1860. *Brazil.*

**26. H. tenellus,** Reeve, Conch. Icon. f. 6, 1860. *Pernambuco.*

**27. H. tenuilabris,** Reeve, Conch. Icon. f. 22, 1860. *Brazil.*

**28. H. tuberculatus,** (Melania) Wagner, 1827.
*Aylacostoma tuberculatum*, Spix, Test. Brazil p. 15, t. 8, f. 4, 1827.
*Melania tuberculata*, (Wagn.) Brot, Mater. i, p. 45, 1862.
*Melania asperata*, (Lamarck) Menke Synops. p. 43, (non Lamarck). *Brazil.*

**39. H. Venezuelensis,** (Melania) Dunker, MSS. Mus. Cuming. Reeve, Conch. Icon. f. 81, 1860. *Venezuela.*

**30. H. Wesselii,** Brot, Journ. Conch. 1864. t. 2, f. 2.

**31. H. zebra,** Reeve, Conch. Icon. f. 15, c, d, 1860. *Brazil.*

## Genus **CLEA,** A. Adams.

Proc. Zool. S. Lond. 1855.

**1. C. Annesleyi,** Benson, Ann. Mag. N. H. 1860. *Quilon, (Malabar).*

**2. C. funesta,** H. Adams, Proc. Zool. Soc. Lond. 1861. *Malacca.*

**3. C. nigricans,** A. Adams, Proc. Zool. Soc. Lond. 1855, p. 119.
*Hemisinus nigricans*, (A. Ad.) Reeve, Conch. Icon. f. 25, 1860. Brot, Mater. i, p. 61, 1862.
*Malacca; Sarawak, (Borneo.)*

Genus **CANIDIA**, H. Adams.

Proc. Zool. Soc. Lond. 1861.

1. **C. fusca**, H. Adams, Proc. Zool. S. Lond. 1861.
*Cambodia.*

2. **C. Baudoniana**, Mabille.
*Hemisinus Baudonianus*, Mabille, Journ. Conch. 1866, t. 7, f. 1.
*Cambodia.*

3. **C. Helena**, Meder, (Melanopsis) MSS.
*Melania Helena*, (Meder) Phil. Abbildg. t. 4, f. 4, 1847.
*Melanopsis Helena*, (Meder) Mousson, Moll. Java t. 10, f. 4, 1849.
*Canthidomus Helena*, (Meder) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Hemisinus Helena*, (Meder) Reeve, Conch. Icon. f. 24, 1860. Brot, Mater. i, p. 61, 1862. *Java.*

4. **C. Theminckiana**, Petit.
*Melania Theminckiana*, Petit, Journ. Conch. 1853, t. 7, f. 11.
*Melania Helena*, Meder, var. Petit, Journ. Conch. 1856, p. 41.
*Canthidomus Theminckiana*, (Petit) H. and A. Ad., Gen. of Rec. Moll. 1858.
*Hemisinus Helena*, Meder var. Brot, Mater. i, p. 61, 1862.
*Java.*

Genus **MELANOPSIS**, Ferussac.

Essai d'une Methode. 1807.

1. **M. Ammonis**, Tristram, Proc. Zool. S. Lond. 1865, p. 542.
*Ammon, East of Jourdain.*

2. **M. aperta**, Gassies, Faun. Nov. Caled. t. 7, f. 11, 1863.
*Jengen, (Nov. Caledon.)*

3. **M. brevis**, Morelet, Test. nov. Austral. 1857.
Gassies, Faun. nov. Calid. t. 7, f. 10, 1863.
*Kanala, Balade, (N. Caled.)*

4. **M. cariosa**, Linné, (Murex) Syst. Nat. xii, p. 1220, 1767. Deshayes, in Lam. An. s. V. No. 8, 1838. Rossmæssler, Icon. f. 680, 1839; 846, 1854, (exclus. synon.) Hanley, Conch. Misc. f. 30, 1854. Reeve, (partim) Conch. Icon. f. 4, d, e, 1860.
*Melanopsis pyramidalis*, Lang, Isis. 1833, ix, p. 430.
*Melanopsis costellata*, Ferussac, Monogr. Melanops. No. 6, 1823.

*Melanopsis Sevillensis*, Grateloup, Mèm. plus. esp. Coq. 1840, t. 4, f. 10, 11.

*Canthidomus costatus*, (Feruss.) Chenu, (partim) Man. Conch. f. 2071, 1859.

*Canthidomus cariosa*, (L.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Spain.*

**5. M. carinata,** Gassies, Faun. Nov. Caled. t. 7, f. 13, 1863. *Balade, Kanala, (N. Caled.)*

**6. M. Charpentieri,** Parreyss, MSS. *Schiraz.*

**7. M. costata,** Ferussac, Monogr. Melanops. No. 5, t. 1, f. 14, 15, 1823.

Deshayes in Lam., An. s. V. No. 1, 1838. Encyclop. t. 458, f. 7, 1816. Chemnitz, xi, f. 2082–83, 1786. Guérin, Icon. Regne Anim. t. 13, f. 13, 1829–44. Sowerby, Gen. of Shells f. 3, 1820–24.

*Melania costata*, Olivier, Voy. Levt. t. 31, f. 3, 1801–1807.

*Canthidomus costata*, (Oliv.) H. and A. Ad., Gen. of Rec. Moll. 1858.

*Canthidomus costatus*, (Fer.) Chenu, Man. Conch. f. 2072, 2077, 1859.

*Melanopsis cariosa*, (Linné) Reeve, (partim) Conch. Icon. f. 4, b, c, 1860.

*Melanopsis subcostata*, Parreyss, MSS.

*Melanopsis Jordanica*, var., Roth., Moll. Spec. t. 2, f. 12, 13, 1839.

*Melanopsis cariosa*, (Linné) Reeve, (partim) Conch. Icon. f. 4, f–h. *Rhodes, Palestine.*

**8. M. Deshaysiana,** Gassies, Faun. Nov. Caled. t. 6, f. 12, 1863. *New Caledonia.*

**9. M. Dufourii,** Ferussac, Monogr. Melanops. p. 24, No. 2, t. 1. f. 16, 1823.

Graells, Catel. Moll. Espana f. 20–22, 1846. Rossmässler, Icon. f. 835–839, 1854. Reeve, (partim.) Conch. Icon. f. 1, c, 1860.

*Lyrcea Dufourii*, (Graells) H. and A. Ad., Gen. of Rec. Moll. 1858.

*Buccina Maroccana*, Chemnitz, (partim.) x, t. 210, f. 2080—81, 1786.

*Melanopsis Maroccana*, (Chenu) Gassies, Descr. Cog. Alg. f. 5, 6, 1856. Bourguignat, Mal. Alg. t. 15, f. 24–26, 1864–66.

*Melanopsis Doriae*, Issel, Catal. Moll. Miss. Ital. Persia, 1865, in Mém. Zool. Ac. Sc. Torino Sér. ii, Vol. 23.

VAR. A. *Melanopsis Graellsii*, Villa, in Graells Catal. Moll. España f. 16–19, 1846.

*Melanopsis Dufourii*, (Fer.) var. Rossm. Icon. f. 841, 1854. Reeve, Conch. Icon. f. 1, a, b, c, 1860.

*Buccinum tricarinatum*, Lamark, An. s. V. No. 31, 1822. *Spain, Algeria, Morea, Persia, Tuscany.*

VAR. B. *Melanopsis etrusca*, Villa, (ubi ?)

**10. M. eremita,** Tristram, Proc. Zool. S. Lond. 1865, p. 542. *Palestine, near the Dead Sea.*

**11. M. frustulum,** Morelet, Test. Nov. Austral. 1857. Gassies, Faun. Nov. Caled. t. 7, f. 14, 1863, (an = *M. variegata*, Morelet ?) *Kanala, Jengen, (New Caled.)*

**12. M. Hammanensis,** Gassies, Descr. Coq. Alg. f. 9, 10, 1856. Bourguignat, Mal. Alg. t. 15, f. 21–23, 1864–1866. *Oued el Hamman, (Algeria.)*

**13. M. insignis,** Parreyss, MSS. *Persepolis, (Persia.)*

**14. M. Kotschyi,** von dem Busch, Phil. Abbildg. t. 4, f. 11, 1847. Reeve, Conch. Icon. f. 7, 1860.

*Canthidomus Kotschyi*, (v. d. B.) H. and A. Ad., Gen. of Rec. Moll. 1858. *Persepolis, (Persia).*

**15. M. lineolata,** Gassies, Journ. Conch. vi. t. 9, f. 9, 10, 1857.

*Melanopsis livida*, Gassies, Faun. Nov. Caled. t. 7, f. 9, 1863, (an = *M. frustulum*, Morelet, var. ?) *Balade, (N. Caled.)*

**16. M. Lorcana,** Guirao, Mall. Blätt. 1854, p. 32. Rossmässler, Icon. f. 845, 1854. *Lorca, (Murcia.)*

**17. M. Maresi,** Bourguignat, Moll. Sahara (Duveyrier) 1864. Mal. Alg. t. 16, f. 22—24, 1864—66. *Tunisia.*

**18. M. neritoides,** Gassies, Journ. Conch. vii, p. 371, 1859. 1859. Faun. Nov. Caled. t. 7, f. 15, 1863. *Balade, Jengen, Kanala, (N. Caled.)*

**19. M. nodosa,** Ferussac, Monogr. Melanops. No. 7, t. 1, f. 13, 1823.

*Lyrcea nodosa*, (Fer.) H. and A. Ad., Gen. of Rec. Moll. 1858. Chenu, Man. Conch. f. 2078, 1859.

*Melanopsis affinis*, Ferussac, Mém. Geol. p. 54, No. 3, 1814. *Bagdad.*

**20. M. ovata,** Dunker, Mall. Blätt. 1861, p. 150, (an = *M. Zelandica*, Gould ?) *New Zealand.*

**21. M. Parreysii,** Mühlfeld, MSS. in Phil. Abbildg. t. 4, f. 15, 1847.
Reeve, Conch. Icon. f. 5, 1860.
*Canthidomus Parreyssii*, (Mhlf.) H. and Ad., Gen. of Rec. Moll. 1858. *Hungary.*

**22. M. praerosa,** Linné, (Buccinum) Syst. Nat. xii, p. 1203, No. 471, 1767.
Chemnitz, ix, t. 121, f. 1035, 1036, 1786. Reeve, (partim) Conch. Icon. f. 10, a, c, d, 1860.
*Bulimus praerosus*, Bruguière, Encycl. Meth. p. 361, No. 105, 1792.
*Buccinum praemorsum*, Linné, Syst. Nat. x, p. 740, No. 408, 1758—9.
*Melanopsis praemorsa*, (L.) Gassies, Descr. Cog. Alg. No. 15, 1856.
*Melanopsis castanea*, Ferussac, Mém. Géol. No. 6, 1814.
*Melania buccinoidea*, Olivier, Voy. Levt. t. 17, f. 8, 1801—1807.
*Melanopsis buccinoidea*, Ferussac, Monogr. Melanops. No. 1, 1823. Sowerby, Gen. of Shells, f. 2, 1820–24. Bowdich, Elem. Conch. t. 6, f. 18; t. 8, f. 14, 1820–22.
*Melanopsis lævigata*, Lamarck, An. s. V. No. 2, 1822. Encycl, Method. t. 458, f. 8, 1816. Chenu, Man. Conch. f. 2076, 1859.
*Melanopsis erosa*, Roth, Moll. Spec. p. 24, 1839.
*Melanopsis Ferussaci*, Roth, Moll. Spec. 1839, t. 2, f. 10.
*Melanopsis brevis*, Parreyss, MSS. Mousson Coq. Bellardi p. 51, 1854.
*Melanopsis oliva*, Cristoforis, Jan. Catal. Coll.
*Melanopsis Mingrelica*, Mousson, Coq. Schläfli, ii, 1863, p. 91.
*Melanopsis Rothii*, Ziegler, MSS. fide Parreyss.
*M. fusiformis*, Sowerby, Gen. of Shells f. 5, 1820—24.
*Smyrna, Fl. Leonthes, Mingrelia, Syra, Greece, Algeria.*

**23. M. Retoutiana,** Gassies, Faun. Nov. Caled. t. 6, f. 9, 1863. *New Caledonia.*

**24. M. Saulcyi,** Bourguignat, Catal. Raison. Moll. Saulcy, p. 66, t. 2, f. 52, 53, 1853.
Reeve, Conch. Icon. f. 8, 1860. *Palestine.*

**25. M. scalaris,** Parreyss, (non Gassies) MSS. *Deva (ubi?)*

**26. M. Strangei,** Reeve, Conch. Icon. f. 3, a, b, 1860. *New Zealand.*

**27. M. Tingitana,** Morelet, Journ. Conch. 1864, p. 155.
*Morocco.*

**28. M. turcica,** Parreyss, MSS. *Jourdain.*

**29. M. variabilis,** von dem Busch, Phil. Abbildg. t. 4, f. 7, 10, 1847.
Reeve, Conch. Icon. f. 6, 1860.
*Melanopsis fasciata,* Parreyss, MSS. *Schiraz, Persepolis.*

**30. M. variegata,** Morelet, Test. Nov. Austral. 1857.
Gassies, Faun. Nov. Caled. t. 7, f. 12, 1863.
*Melanopsis fulgurans,* Gassies, Journ. Conch. vii, p. 371, 1859.
*Melanopsis lentiginosa,* Reeve, Conch. Icon. f. 9, 1860.
*Kanala, Balade,* (*New Caledonia.*)

**31. M. Wagneri,** Roth, Moll. Spec. 1839, t. 2, f. 11, 1839.
(*?*) *Lyrcea Dufourii,* (Féruss.) Chenu, Man. Conch. f. 2079, 1859.
*Melanopsis scalaris,* Gassies, Descr. Coq. Alg. f. 7, 8, 1856. Bourguignat, Mal. Alg. t. 15, f. 19, 20, 1864.
*Melanopsis prærosa,* (L) var. in Reeve Conch. Icon. f. 10, b, 1860. (An = *M. Dufourii,* Féruss. var. ?)
*Smyrna, Algeria.*

**32. M. Zelandica,** Gould, Proc. Bost. S. N. H. 1847.
Exped. Shells f. 146, 1842. Hanley, Conch. Misc. f. 64, 1857. Chenu, Man. Conch. f. 2069, 1859. Reeve, Conch. Icon. f. 2, 1860. *New Zealand.*

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*Species ignotæ.*

*Melanopsis cornea,* Ferussac.
" *denegabilis,* Ferussac, H. and A. Ad. Gen of Rec. Moll.
" *orientalis,* von dem Busch.
" *truncata,* Cristoforis, Jan. Catal. Coll.
" *trifasciata,* Gray, H. and A. Ad. Gen. of Rec. Moll.
" *tigris,* Ferussac (Canthidomus), H. and A. Ad. Gen. of Rec. Moll.
" *zebra,* Cristoforis Jan. Catal. Coll.

Genus **PALUDOMUS**, Swainson.

Treat. Mal. 1840.

§ 1.

*Tanalia*, Gray, 1847.)

**1. P. loricatus**, Reeve, Conch. Icon. f. 1, b, c, 1847.
*Tanalia loricata*, (Reeve) Chenu, Man. Conch. f. 2215, 1859.
*? Nerita aculeata*, Chemnitz, f. 1642.*
*Tanalia aculeata*, (Chemn.) H. and A. Ad., Gen. of Rec· Moll. t. 36, f. 3, 1858. Chenu, Man. Conch. f. 2216, 1859. Blanford, (partim) Trans. Lin. Soc. Lond. xxiii, t. 60, 1862.
*Paludomus erinaceus*, Reeve, Proc. Zool. S. Lond. 1852. Reeve, Conch. Icon. f. 1a, (nom. *loricatus*) 1847.
*P. æreus*, Reeve, Proc. Zool. S. Lond. 1852.
*P. undatus*, Reeve, Conch. Icon. f. 2, 1847.
*Tanalia undata*, (Reeve) Chenu, Man. Conch. f. 2218, 1859.
*P. Layardi*, Reeve, Proc. Zool. S. Lond. 1852.
*P. rudis*, Reeve, ibid.
*P. pictus*, Reeve, Conch. Icon. f. 10, 1847.
*P. funiculatus*, Reeve, Conch. Icon. f. 11, 1847.
*Tanalia similis*, Layard, Ann. Mag. N. H. 1855.
*Tanalia Reevei*, Layard, ibid.
*P. nodulosus*, Dohrn, Proc. Zool. S. Lond. 1857.
*P. Swainsoni*, Dohrn, ibid.
*P. Skinneri*, Dohrn, ibid.
*P. distinguendus*, Dohrn, ibid.
*P. sphæricus*, Dohrn, ibid.
*P. solidus*, Dohrn, ibid.
*P. torrenticola*, Dohrn, Proc. Zool. S. Lond. 1858. *Ceylon.*

**2. P. neritoides**, Reeve, Conch. Icon. f. 3, 1847.
*Tanalia aculeata*, (Gmelin) Blanford, (partim) Trans. L. Soc. Lond. xxiii, 1862, t. 60, sér. i, f. 1; sér. iii a, f. 1; sér. iiib, f. 1.
*P. Gardneri*, Reeve, Conch. Icon. f. 9, 1847.
*Tanalia Gardneri*, (Reeve) Chenu, Man. Conch. f. 2217, 1858.
*P. Tennantii*, Reeve, Conch. Icon. f. 12, 1847.
*Tanalia Tennantii*, (Reeve) Chenu, Man. Conch. f. 2214, 1859.
*P. dilatatus*, Reeve, Proc. Zool. S. Lond. 1852.

* *Nerita aculeata*, Gmelin, No. 72, is *Neritina* sp. (*N. aculeata*, Gmel. in Reeve Conch. Icon.)

*P. Cumingianus*, Dohrn, Proc. Zool. S. Lond. 1857.
*P. Dromedarius*, Dohrn, ibid.
*P. Hanleyii*, Dohrn, Proc. Zool. S. Lond. 1858. *Ceylon.*

3. **P. violaceus,** (Tanalia) Layard, Ann. Mag. N. H. 1855. *Ceylon.*

§ 2.

(*Philopotamis*, Layard, 1855.)

4. **P. Ajanensis,** Morelet, Sér. Conch. t. 6, f. 10, 1860. *Hafoun, Cape Guardafui.*

5. **P. baccula,** Reeve, Proc. Zool. S. Lond. 1852.
Hanley, Conch. Misc. f. 63, 1857. (An = *P. nigricans*, Reeve ?) *Ganges; Seychelles* (Cuming.)

6. **P. bicinctus,** Reeve, Proc. Zool. S. Lond. 1852.
Hanley, Conch. Misc. f. 42, 1854.
*Melania globulosa*, Gray, Griff. Cuv. t. 14, f. 6, 1834.
*Paludomus globulosus*, (Gray) Reeve, Conch. Icon. f. 4, 1847, Chenu, Man. Conch. f. 2210, 1859.
*Philopotamis globulosa*, (Gray) Blanford, Trans, L. Soc. Lond. xxiv, t. 27, f. 1, a–e, 12, a, b, 1863.
*Paludomus globosus*, (Gray) H. and A. Ad., Gen. of Rec. Moll. 1858. *Ceylon.*

7. **P. conicus,** Gray, Griff. Cuv. t. 14, f. 5, 1834.
Hanley, Conch. Misc. f. 34, 1854. Reeve, Conch. Icon. f. 14 a, b, c, 1847. Chenu, Man. Conch. f. 2211, 1859. *Himalaya.*

8. **(?) P. crassus,** (Melania) von dem Busch, Phil. Abbildg. t. 1, f. 10, 11, 1842. *Bengal.*

9. **P. nigricans,** Reeve, Conch. Icon. f. 6, 1847.
Chenu, Man. Conch. f. 2213, 1859.
*Philopotamis nigricans* (Reeve), Blanford, Trans. L. S. Lond. xxiv, t. 27, f. 3 a—e, 15 a, b, 1863. *Ceylon.*

10. **(?) P. olivaceus,** Reeve, Conch. Icon. f. 5, 1847.
Chenu, Man. Conch. f. 2212, 1859. *Sumatra.*

11. **P. regalis,** (Philopotamis) Layard, Ann. Mag. N. H. 1855. *Ceylon.*

12. **P. sulcatus,** Reeve, Conch. Icon. f. 8, 1847.
*Philopotamis sulcata* (Reeve), Blanford, Trans. L. S. Lond. xxiv, t. 27, f. 5 a—c, 11, 1863. *Ceylon.*

13. **P. Thwaitesii,** (Philopotamis) Layard, Ann. Mag. N. H. 1855 (an = *sulcatus*, Reeve var. ?) *Ceylon.*

§ 3.

(*Paludomus* (Swainson), Layard, 1855.)

**14. P. abbreviatus,** Reeve, Proc. Zool. S. Lond. 1852. *Ceylon.*

**15. P. chilinoides,** Reeve, Conch. Icon. f. 7 a—c, 1847.
Blanford, Trans. L. S. Lond. xxiv, 1863, t. 27, f. 4 a—f.
*P. constrictus*, Reeve, Proc. Zool. S. Lond. 1852.
*P. phasianinus*, Layard (non Reeve), Ann. Mag. N. H. 1855.
*P. lævis*, Layard, Ann. Mag. N. H. 1855.
*P. fulguratus*, Dohrn, Proc. Zool. S. Lond. 1857.
*P. nasutus*, Dohrn, ibid. *Ceylon.*

**16. P. clavatus,** Reeve, Proc. Zool. S. Lond. 1852. *Ceylon.*

**17. P. decussatus,** Reeve, Proc. Zool. S. Lond. 1852.
*Philopotamis decussata* (Reeve), Blanford, Trans. L. S. Lond. xxiv, 1863, t. 27, f. 6, 10. *Ceylon.*

**18. P. labiosus,** Benson, Ann. Mag. N. H. 1858. *Burmah.*

**19. P. maculatus,** (Rivulina) Lea, Proc. A. N. S. Phil. 1856. Obs. Gen. Unio, xi, t. 22, f. 10, 1866.
*Ahmednugger, India.*

**20. P. maurus,** Reeve, Proc. Zool. S. Lond. 1852. *Ganges.*

**21. P. ornatus,** Benson, Ann. Mag. N. H. 1858. *Burmah.*

**22. P. paludinoides,** Reeve, Proc. Zool. S. Lond. 1852.
*Ganges.*

**23. (?) P. petrosus,** (Paludina) Gould, Proc. Bost. S. N. H. 1843.

**24. P. phasianinus,** Reeve (non Layard), Proc. Zool. S. Lond. 1852.
Hanley, Conch. Misc. f. 62, 1857. *Seychelles.*

**25. P. palustris,** Layard, Ann. Mag. N. H. 1855. *Ceylon.*

**26. P. punctatus,** Reeve, Proc. Zool. S. Lond. 1852.
*Mauritius.*

**27. P. pyriformis,** Dohrn, Proc. Zool S. Lond. 1858.
*Ceylon.*

**28. P. regulatus,** Benson, Ann. Mag. N. H. 1858. *Burmah.*

**29. P. Stephanus,** (Melania) Benson, Journ. As. Soc. Calcutta, v, p. 747, 1836.
Reeve, Conch. Icon. f. 11, 1847. Chenu, Man. Conch. f. 2209, 1859.

*Melania coronata*, von dem Busch, Phil. Abbildg. t. 1, f. 5, 1842. *Bengal.*

**30. P. trifasciatus,** Reeve, Proc. Zool. S. Lond. 1852. *Ganges.*

**31. P. Tanjoriensis,** Blanford, Trans. Lin. S. Lond. xxiv, 1863, t. 27, f. 2 a—e.

*Helix Lanschaurica*, Gmelin, 3655, No. 244.
*Helix Tanschauriensis* (Gmel.), Chemnitz, ix, f. 1243, 1786.
*Helix fluviatilis*, Dillwyn, 959. Wood, Ind. Test. f. 160, 1825.
*Paludomus acutus*, Reeve, Proc. Zool. S. Lond. 1852.
*Melania modicella* (Rivulina), Lea, Proc. Zool. S. Lond. 1850.
*Rivulina modicella* (Lea), H. and A. Ad., Gen. of Rec. Moll. Supplem. ii, p. 623, 1858.
*Paludomus spiralis*, Reeve, Conch. Icon. f. 15, 1847.
*Paludina lutosa*, Souleyet, Voy. Bonite, t. 31, f. 28, 1852.
*Paludomus spurcus* (Souleyet), H. and A. Ad., Gen. of Rec. Moll. t. 36, f. 2, 1858. Chenu, Man. Conch. f. 2208, 1859.
*Paludomus parvus*, Layard, Ann. Mag. N. H. 1855.
*Melania obesa*, Philippi, Abbildg. t. 4, f. 3, 1847.
*Melania Zeylanica* (Rivulina), Lea, Proc. Zool. S. Lond. 1850. *Pondichery, Timor, Ceylon, Bombay.*

§ 4.

(*Stomatodon,* Benson, 1862.)

**32. P. (?Tanalia) Stomatodon,** Benson, Ann. Mag. N. H. 1862, c, figurâ. *Travancore, India.*

## SUPPLEMENT.

SPECIES PUBLISHED SINCE JANUARY 1ST, 1867.

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### Genus **MELANIA.**

§ 2.

**7 a. M. pisum,** Brot, Mater. ii, t. 2, f. 5, 1868. *Java?*

§ 6.

**70 a. M. citrina,** Brot, Mater. ii, t. 3, f. 13, 1868. *Siam.*

**83 a. M. insolita,** Brot, Mater. ii, t. 3, f. 4, 1868.
*M. Siamensis*, Martens, (ubi ?) *Siam.*

**90 a. M. Zollingeri,** Brot, Mater. ii, t. 2, f. 4, 1868. *Java.*

§ 7.

**99 a. M. Bernardii,** Brot, Mater. ii, t. 2, f. 13, 1868.

**170 a. Christobalensis,** Brot, Mater. ii, t. 2, f. 1, 1868.
*S. Christoval.*

§ 8.

**188 a. M. acutespira,** Mousson, Journ. Conch. 1869, t. 15, f. 4. *Upolu.*

**189 a. M. aperta,** Mousson MSS. Catal. Godeffroy. *Ovalan.*

**190 a. M. bifasciata,** Mousson, Journ. Conch. 1869, t. 15, f. 3. *Upolu.*

**191 a. M. compressa,** Brot, Mater. ii, t. 3, f. 5, 1868.

**200 a. M. Lamberti,** Crosse, Journ. Conch. 1869, p. 415.
*New Caledonia.*

**202 a. M. laxa,** Mousson, Journ. Conch. 1869, t. 15, f. 6.
*M. gratiosa*, Mousson MSS. Catal. Godeffroy. *Upolu.*

**209 a. M. Moricandi,** Brot, Mater. ii, t. 3, f. 6, 7, 1868.

**211 a. M. Ninafouana,** Mousson MSS. Catal. Godeffroy. *Ninafou.*

**213 a. M. peregrina,** Mousson, Journ. Conch. 1869, t. 15, f. 5. *Upolu.*

**217 a. M. subexusta,** Mousson MSS. (Journ. Conch. 1869. *Upolu.*

§ 9.

**250 a. M. asperula,** Brot, Mater. ii, t. 1, f. 11, 1868. *Java.*

**255 a. M. Damonis,** Brot, Mater. ii, t. 1, f. 9, 1868. *S. Christoval.*

§ 13.

**235 a. M. calcitrapa,** Brot, Mater. ii, t. 3, f. 9, 1868.

Genus **VIBEX.**

**9. V. subauritus,** Brot (Melania), Mater. ii, t. 1, f. 1—3, 1868.

*M. soriculata* (? juvenis), Morelet, Journ. Conch. 1864, p. 287. *Grand Bassan.*

Genus **PIRENA.**

**1. P. aspera,** Brot, Mater. ii, t. 1, f. 6, 1868.

Genus **HEMISINUS.**

**27 a. H. thermalis,** (Tit.) Parreyss MSS. Brot, Mater. ii, t. 3, f. 14, 15, 1868. *Hungary.*

Genus **MELANOPSIS.**

**7 a. Melanopsis curta,** Gassies, Journ. Conch. 1870, p. 146. *New Caledonia.*

**9 a. M. Dumbeensis,** Crosse, Journ. Conch. 1869, p. 70, t. 8, f. 4. *New Caledonia.*

**10 a. M. faseolaria,** Parreyss MSS. Brot, Mater. ii, t. 2, f. 10, 1868. *Persepolis.*

**11 a. M. fusca,** Gassies, Journ. Conch. 1870, p. 147. *New Caledonia.*

**11 b. M. fusiformis,** Gassies, Journ. Conch. 1870, p. 148. *New Caledonia.*

**15 a. M. lirata,** Gassies, Journ. Conch. 1869, p. 77.
*New Caledonia.*

**17 a. M. Mariei,** Crosse, Journ. Conch. 1869, p. 69, t. 8, f. 3.
*New Caledonia.*

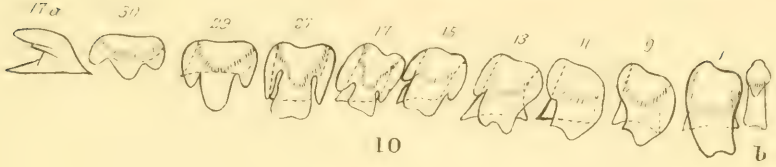
**19 a. M. obesa,** Guirao MSS. Brot, Mater. ii, t. 1, f. 14, 15, 1868. *Murcia.*

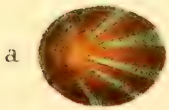
**21 a. M. Pinchinati,** Bourguignat, Rev. Mag. Zool. 1868.
*Aragon.*

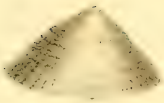
**23 a. M. robusta,** Gassies, Journ. Conch. 1870, p. 147.
*New Caledonia.*

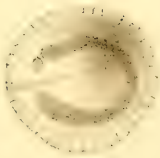
**25 a. M. Souverbieana,** Gassies, Journ. Conch. 1870, p. 148.
*New Caledonia.*

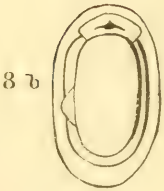
**33. M. Zonites,** Gassies, Journ. Conch. 1870, p. 147.
*New Caledonia.*

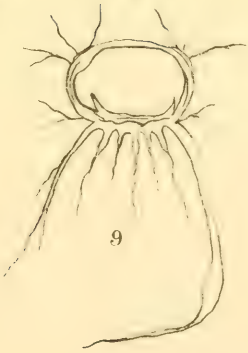


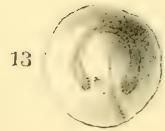



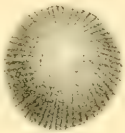





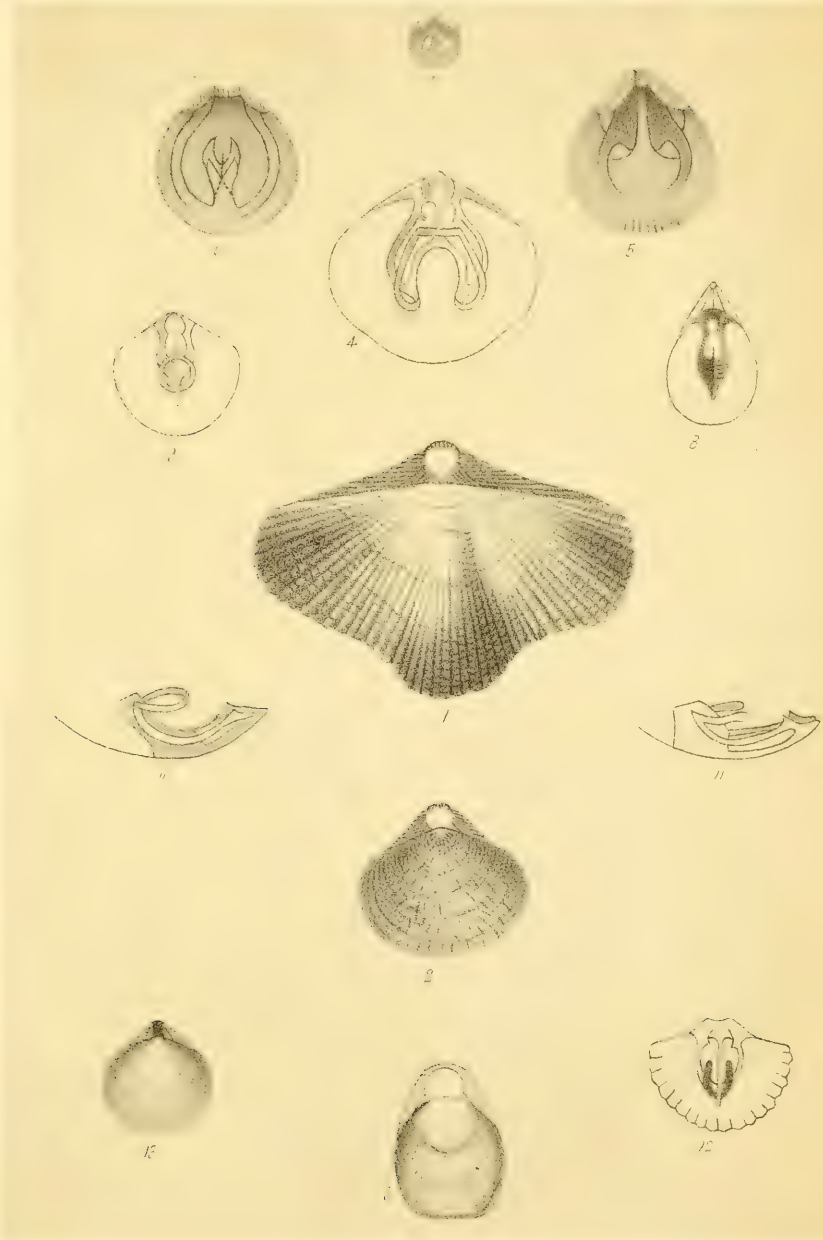



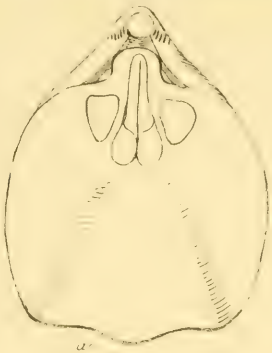



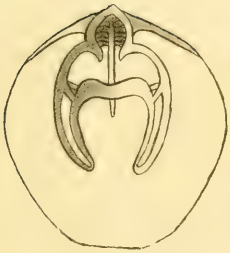

Dall, On Siphonaria and Gadinia.

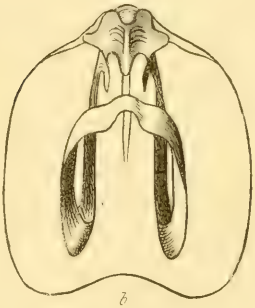


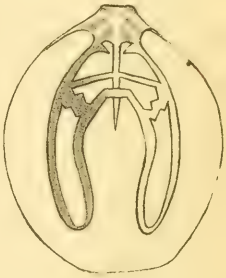
W. H. DALL, DEL.

Dall, On Brachiopoda.





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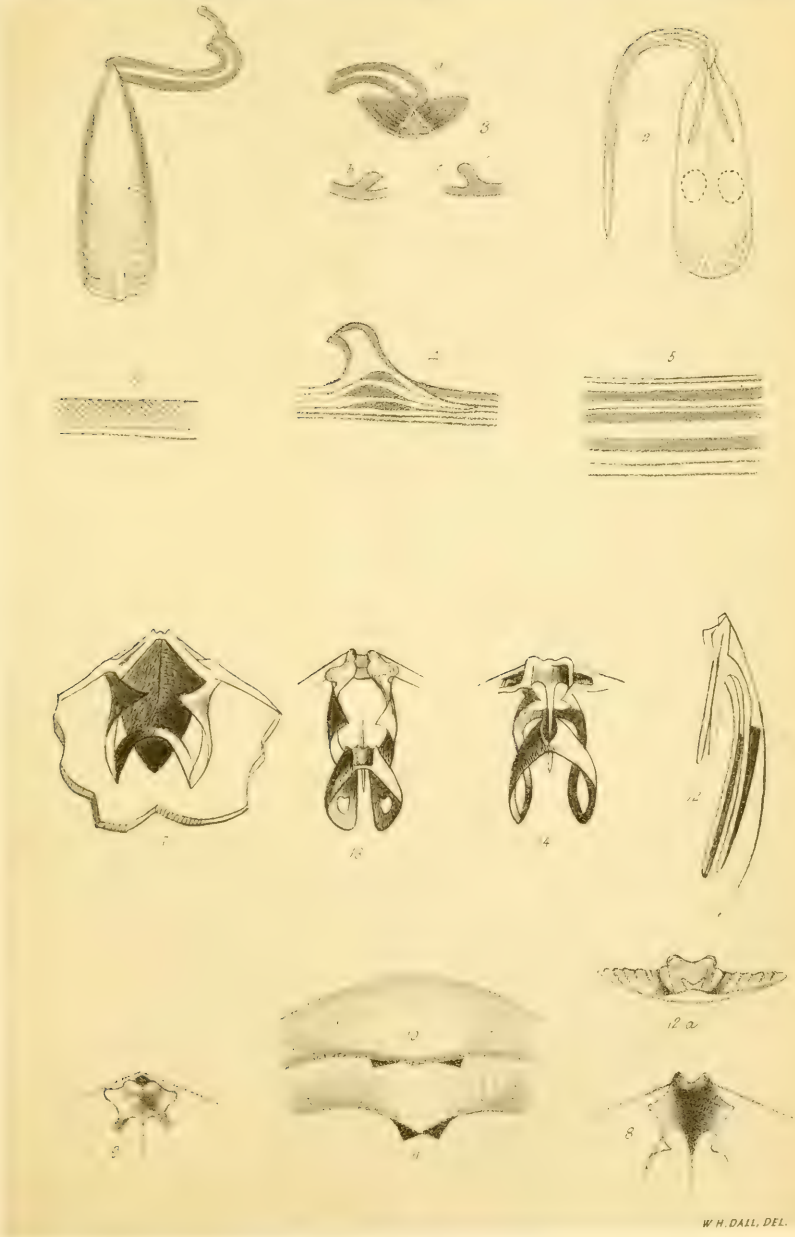


Dall On Brachiopoda.

Conrad, On Upper Amazon Fossils.

AMERICAN

# JOURNAL OF CONCHOLOGY.

NEW SERIES.

PUBLISHED BY THE

CONCHOLOGICAL SECTION of the Academy of Natural Sciences of Philadelphia

VOL. VI. 1870–71. PART 3.

*Meeting July 7th*, 1870.

Mr. TRYON, Vice-Director, in the chair.

The Chairman called attention to the curious error committed by several conchologists in placing *Strebelia* (*Physella*) *Berendtii* among the fluviatile mollusks. He supposed that the resemblance of the original generic name to *Physa* was the cause of the error. This Mexican snail has a Glandiniform shell, and Mr. T. believed that its nearest relation would probably be with *Glandina*. The *Physella Berendtii* is described as a fluviatile mollusk in Mr. Binney's work on the Mollusca of N. America, recently published by the Smithsonian Institution, and since, in Mr. Dall's paper on the classification of Limnæidæ, published in the Annals of the N. York Lyceum of Nat. Hist. There is nothing contained in the original description of the species or in subsequent reference to it by European authors, to cause a doubt of its being terrestrial.

Mr. John S. Phillips presented to the Section the MSS. (and colored drawings of the plates) of Spix's Testacea of Brazil.

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*Meeting Oct. 6th*, 1870.

Dr. RUSCHENBERGER, Director, in the chair.

An extract of a letter from Wm. H. Dall was read, as follows:

"I would call your attention to a fact which may be of inte-

rest to the Section. A late paper by A. G. More, in the Annals and Magazine of Natural History, gives, ostensibly for the first time, an account of the animal of *Limnæa involuta*, Harvey. The description of this species was *read* by Mr. Harvey to the Linnean Society in April, 1834, but the description was first *published* in the Annals of Nat. History, v, 1st series, p. 22, March, 1840, by W. Thompson, Esq., with a thorough account of the form and anatomy of the animal by John Goodsir, Esq. In view of this fact, it is extraordinary that thirty years after, in the same periodical, the animal should be described again, as for the first time."

The following papers were presented and referred to Committees:

"On the Relations of the Amphiperasidæ;" by Theo. Gill.

"Notes on the Land Shells of East Tennessee;" by Jas. Lewis, M. D.

"Descriptions of New Fossil Shells of the Upper Amazon; by T. A. Conrad.

"Descriptions of new Tertiary Fossils, with Notes on two genera of Lamellibranchiata;" by T. A. Conrad.

"Notes on Lingual Dentition, No. 2;" by W. G. Binney and Thos. Bland.

"Notices and Reviews of New Conchological Works;" by G. W. Tryon, Jr.

A specimen of *Unio cylindricus*, Say, from the Wabash river, was presented by Mrs. L. W. Say. The pattern of coloring of the epidermis in this specimen consists of broad and narrow green rays, disposed on a yellow ground. Very few rayed specimens of the species are known to science.

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*Meeting Nov. 3d*, 1870.

Dr. RUSCHENBERGER, Director, in the chair.

Several donations to the cabinet and library were announced.

The following papers were presented for publication:

"On the Limpets, with special reference to the species of the West Coast of America, and to a more natural Classification of the Group;" by Wm. H. Dall.

"Shells of the Holston River;" by James Lewis, M. D.

## ON THE RELATIONS OF THE AMPHIPERASIDÆ.

BY THEODORE GILL, M. D., PH. D.

Various species and groups of species, which a critical examination demonstrates to be little related to each other and indeed to be very widely removed from their mimetic analogues, are yet so similar in superficial form or features, that close approximation of such is perfectly justifiable and may perhaps be the only alternative so long as the entire organization remains unknown. Numerous are the molluscous forms that have been thus approximated on account of a similarity of the shells, but which are now ascertained to belong to entirely different groups. Reference need only be here made to the patelliform shells, now distributed among different orders and subclasses, to *Lunatia* and *Ampullaria*, to *Meladomus* and *Viviparus*, to *Marisa* and *Planorbinæ*, to *Erato* and the *Marginellidæ*, to *Turridæ* and the *Mitridæ*,* and to the *Amphiperasidæ* and *Cypræidæ*. But it must be confessed that while the similarity between most of the groups just contrasted is very considerable, that between the Amphiperasidæ and Cypræidæ is in truth comparatively slight and of the most superficial nature. And yet the distinctness and the remote character of the affinities of the really similar shells is now generally admitted, while many of the best conchologists still approximate next to each other, and evidently with the idea that their affinity is more than usually great, the last mentioned groups. It will therefore not be a labor of supererogation to inquire into the propriety of such a collocation.

It is evident that the idea of the affinity of the Amphiperasidæ and Cypræidæ has been insensibly, perhaps almost wholly, derived from the largest and one of the most common and well known species—the *Amphiperas ovum*. And certainly there is considerable similarity in the general contour of that species to that of the Cypræidæ, and even in color there is a likeness to

* Dr. Troschel has overlooked the prior foundation, by J. E. Gray, of a family (*Turritidæ*) based on the same characters as *Strigatellacea*. See Gray, Proc. Zool. Soc.; Guide, 1857, p. 23.

*C. eburnea*. *Amphiperas ovum*, however, is one of the most aberrant forms of the family to which it has given its name, under the patronymic form, and *Radius volva* is one of the most typical,—that is, it exhibits the plan of growth in its greatest simplicity.

In all the Cypræidæ the shell exhibits at the posterior end the evidences of a spire, although sometimes almost or entirely concealed from view in the adult, and even sunk in an umbilical depression, produced by the accumulation of callous around it. In the young, however, the spire is very distinct, though it may be either depressed or elevated, and the whorls are wound around an axis as in all spiral shells, the modified form of the adult shell being the result of the great successive increase of the whorls, the closeness of the winding near the sutures, the inflection of the labrum and the expansion of a callous deposit over the lips.

On the other hand, the Amphiperasidæ *have not even spiral shells*, the testaceous envelope being simply a shell loosely rolled on itself, and more or less attenuated and twisted at the extremities, and of course a spire is never seen either in young* or old, and the only feature of resemblance in the shell is the inflation of the testaceous roll, combined with the proportionately little attenuation of the extremities, the inflection of the outer lip, and that extension at the extremities which is the co-ordinate of the peculiar plan of growth. The resemblance in form of any species of the Amphiperasidæ to Cypræidæ is therefore simply analogical, and the elements for an exact comparison do not exist. The resemblance between Cypræidæ and certain Cassididæ and Marginellidæ is homological, and based on similar modifications of growth; but in Amphiperasidæ the reverse is decidedly the case. And it may still further be remarked that, while the shells of Cypræidæ, Planorbinæ, Terebridæ and Haliotidæ are comparable among themselves, because they all exhibit modifications of a spiral, the comparison cannot be extended to the Amphiperasidæ. But, at the same time, it may be added that the morphological problem of the conversion of the spiral into the roll is not a difficult one, and various forms, otherwise closely allied, are found among the Tectibranchiates, distinguished from each other by the development of a spiral or simply rolled testaceous envelope. Among the Pectinibranchiates, however, the difference is the co-ordinate of other and more important ones. An illustration may serve best to render the contrast obvious. A circle and an ellipse are two fundamentally

* The embryonic condition is not referred to, and is unknown.

different figures, and yet the character of the ellipse allows of an immense variation, so that one form of it may be superficially entirely unlike another, and only distinguishable from the circle by exact measurement. And yet the circle-like ellipse has all the elements of the ellipse.

As it might be supposed that such differences as those cited must be so obvious as to have at once been remarked, and that there was universal tacit acquiescence as to the fact, but contempt of the systematic value, it may be added that, in the latest edition of the most esteemed "Manual of the Mollusca," *Amphiperas* or "*Ovulum*, Lam.," is expressly defined as having a "shell like *Cypræa;* inner lip smooth," and that both the latter and the family Cyprædæ are accredited with a "spire concealed." In the latest monograph of the family, the shell is expressly said to have a "spire more or less immersed, mostly [!] concealed," and it is remarked that "Linnæus is not to be complimented on his sagacity in having referred the typical species of this group to *Bulla*. The resemblance of the shell of *Ovulum* to that of *Cypræa* is obvious enough, and there is a similar affinity between the animals of the two genera. The *Ovulum* is, in fact, a Cowry, with the extremities more or less produced."*

It may, however, be justly regarded as rather meritorious on the part of Linné to have remarked that real similarity of development of the shells of the forms now called Amphiperasidæ and Bullidæ which induced him to place them in one genus; he at least did not assign a spire to shells in which it is entirely absent: as to his reference of the species to *Bulla*, it is more than possible that he really regarded the Amphiperasidæ as the typical species of *Bulla*, but, as he mentioned no type, it seems expedient to recognize the subsequent subdivision of that group, and the limitation by exclusion to the restricted genus now universally recognized under the name *Bulla*.

Lest the previous remarks may be misunderstood, it may, however, be added that the similarity noticed is simply analogical; for, however similar some of the shells of the respective families may be (*i. e. Volvula* and *Atys*, and most of the Amphiperasidæ), the study of the entire organization demonstrates that they belong to two different subclasses of the Mollusca.

The neglect to notice the true character of the shell of *Amphiperas* is the more remarkable, as in the classic work on the

* Reeve, Monograph of the genus *Ovulum*, 1865, Diagnosis and Remarks.

Mollusca it was especially described,* and the genus was expressly distinguished from *Cypræa* by the constant absence of the spire.† It is true that Lamarck failed to appreciate the value of the difference he perceived, but it must be remembered that the relations of analogy and affinity were not then so well understood as now, and he, too, was unduly impressed by the similarity of contour between the two groups.

The impression conveyed by the superficial resemblance of the shells has been carried over to the consideration of the animal, and formerly the belief was current that the animals of the two groups were scarcely distinguishable, or, as M. Deshayes has remarked, zoologists were not surprised to find that between the two there was a *perfect identity*.‡ M. Deshayes himself has, however, while convinced of the justice of M. de Blainville's opinion, discovered differences between the two forms—not, however, the important ones now recognized—although he has regarded them as of slight value. But when it is asserted that there is a complete identity between the two, or that the differences are slight, it can only be because the two forms exhibit the normal gasteropodous structure with adaptive modifications as regards the shell, and with no very prominent special external modifications; for a more profound study of the organization reveals the most important differences. In the first place, the Amphiperasidæ have a non-retractile snout or muzzle, while the Cypræidæ are one of a small group provided with a snout retractile from the tip. Other important differences in the structure of the oral region have been observed,§ and the difference in the dentition of the radula is very marked, the lateral teeth having an unsymmetrical fan-like form, expanding towards their extremities and finely pectinate. It must also not be forgotten that the visceral sack is the mould on which the shell is framed, and that there must be corresponding differences between it and that of the Cypræidæ.

In view of the differences observed by him, Dr. Troschel has

* "Elles sont enroulées sur elles-mêmes de manière que leur cavité tourne autour de l'axe de la coquille et l'enveloppe entièrement, en sorte qu'elles n'ont réellement point de spire." Lamarck, H. N. des Animaux s. Vert., 2e ed. x, p. 465.

† "Ce caractère du bord gauche jamais denté, et celui d'un défaut constant de spire, suffisent pour distinguer les *Ovules* des Porcelaines."

‡ "Aussi, lorsque MM. Quoy et Gaimard * * * eurent rapporté l'animal de l' *Ovula oviformis*, et lorsque M. de Blainville en eut donné une description et une figure, les zoologistes ne furent point étonnés de trouver, entre cet animal et celui des Porcellaines, une identité complète." Deshayes in Lamarck, H. N. des Animaux s. Vert., x, 1844, p. 465.

§ See Troschel, Gebiss der Schnecken, i, p. 216, 217.

most truly remarked that the affinity of the Amphiperasidæ to the Cypræidæ has been much exaggerated. To that learned naturalist we also owe the definite approximation on substantial grounds of the Amphiperasidæ and *Pediculariacea*,* and the combination of those two families in a technical but at the same time natural group,† distinguished by the form of the lateral teeth of the radula and their comb-like armature, and, it may now be added, by the simple rolling of the shell on itself. Such characters isolate them from the rest of the great group of *Taenioglossa*, of which they are members, and, if any special name is desired, the designation DIGITOGLOSSA, (although a hybrid), imagined by Gray for the Amphiperasidæ, but soon afterwards abandoned, may be taken up and extended to embrace the large group.

As the young shells of Amphiperasidæ are rare in cabinets, it may not be superfluous to add that their character can be ascertained by a longitudinal section of the adult.

* Messrs. Adams admit three families—Cypræidæ, Amphiperasidæ and Pediculariidæ (i, p. 263—274), and Dr Chenu has united all in one family —Cypræidæ (i, p. 264—274, 1859)—but no reasons for such juxtaposition are given, or are apparent from the diagnoses or remarks.

† Troschel, Gebiss der Schnecken, ii, p. 12, 1866.

## NOTES ON THE LAND SHELLS OF EAST TENNESSEE.

BY JAMES LEWIS, M. D.

I am indebted to Miss Annie E. Law, of Concord, Tennessee, for the material on which the following notes are based. Very likely other species than those included herein may hereafter be found in the region accessible to Miss Law; but any such may be regarded as exceptional or very rare, and not likely to be presented in such numbers as to throw much light on species. The species and well marked varieties number 33. Some of them were presented to my notice under circumstances well calculated to impress me with the idea that they were new species. But regarding them as more likely to be favorably received as remarkable varieties of known species, I present them in this list under that form of treatment.

1. HELIX ALBOLABRIS, Say, var. A limited number of specimens of rather small size, depressed spire and light color are all I have seen. Evidently a rare variety.

2. HELIX ALTERNATA, Say. An abundant species of large size, light color—those found in the valley of the Holston being lighter than those found in Monroe county on elevated land. The young specimens are much disposed to be carinate.

3. HELIX ALTERNATA, Say, var. *costata*. A smaller shell with a more depressed spire, strongly marked striæ or ribs. Not abundant.

4. HELIX APPRESSA, Say. Small var. A somewhat abundant shell.

5. HELIX CAPSELLA, Gould, (Plate 12, figs. 1, 2.) A rare species found in Monroe county, on hill sides, associated with *H. suppressa*, Say. When first presented to my notice I was disposed to regard it as a new species, designing to propose for it the name *Helix* (*Hyalina*) *Monroensis*. My specimens have

a diameter of nearly one-third of an inch, and a fraction over seven whorls. Dr. Binney and W. G. Binney ascribe to *capsella* a diameter of one-fifth of an inch and a fraction over six whorls. Notwithstanding the discrepancy, I am constrained for the present to regard my shells as being possibly a variety of *capsella*. Dr. Gould's shells were probably immature.

HELIX CONCAVA, Say. A not very abundant species. Found mostly in the valley of the Holston. My largest specimen is 0.81 inch in diameter. The shells of this species from near Concord are remarkable for their large size.

7. HELIX DEMISSA, Binney.

8. HELIX DOWNIEANA, Bland. About a dozen specimens in all were at various times taken from under a log near Philadelphia, Monroe county. Not found elsewhere.

9. HELIX ELEVATA, Say. A very abundant species. Banded specimens are not uncommon.

10. HELIX EXOLETA, Binney. Rare.

11. HELIX FALLAX, Say. Abundant in the hilly regions of Monroe county.

12. H. FULIGINOSA, Griffith. Found in Blount county, and near Concord. Rare. My largest specimen is nearly $1\frac{1}{4}$ inch in diameter (= $31\frac{1}{2}$ mill.) Mr. W. G. Binney ascribes the diameter 26 mill. to this species.

13. HELIX GULARIS, Say. A very abundant species.

14. HELIX HAZARDI, Bland. A rare species; less abundant than *H. spinosa*, Lea.

15. HELIX INTERNA, Say. A somewhat rare species.

16. HELIX INTERTEXTA, Binney. A somewhat rare species, not so fully developed as in Ohio and New York.

17. HELIX INTROFERENS, Bland. A single specimen mingled with *H. Rugeli*, the larger specimens of which it resembles in form, size and color, is all I have. It has a more constricted aperture than *Rugeli;* the umbilicus is wide at the termination of the last whorl, but more contracted within than in small specimens of *H. fallax* of about the same size. I find only a faint callous thickening on the pillar lip within and near the margin of the aperture by exploring it with a small tenaculum. Greater diameter (excluding the reflected lip) 12 mill. = 0.46 inch. This is less than is given in W. G. Binney's "Land and Fresh Water Shells," but much greater than I find in doubtful specimens sent to me by other correspondents.

18. Helix lævigata, Pfr. A smaller species than *fuliginosa*, found in the hilly regions around Philadelphia, Monroe county, and somewhat more abundant than *fuliginosa* in other parts of East Tennessee.

19. Helix lasmodon, Phillips. A rare species.

20. Helix ligera, Say, var., (Plate 12, figs. 3, 4.) A few specimens, which I am now disposed to regard as a variety of *H. ligera*, were found in a dense coppice on *Fork Creek*. When first presented to my notice I was persuaded they might be regarded as an undescribed species, and designed to submit them for publication as *Helix Annæ*, which being preoccupied, I thought to change to *H. acerra*. A more careful study of the shells made it apparent they were *unusually* large specimens of *H. ligera* Say, only very slightly elevated. On page 290, "Land and Fresh Water Shells," Mr. W. G. Binney has figured a shell (fig. 519) from the mountains of North Carolina, the form and size of which is very near the form and size of my shell. Mr. B. seems disposed to regard his shell as a var. of *Zonites inornata*, which it possibly may be. But I suspect that it is identical with the shell before me, in which case it will no doubt prove to be a large form of *H. ligera* hitherto little known. My shell has seven whorls and a fraction. Greater diameter 0.81 inch = 18 mill. Dr. Binney says of *ligera*—"greatest transverse diameter five-eighths of an inch (0.625), usually much less." My shell exceeds the maximum given by Dr. B., by about one-twelfth of an inch. One specimen found on Chilhowee Mountains, Blount county.

21. Helix major, Binney. Miss Law's shells are characteristic in form and color, but are less in size than the maximum given by W. G. Binney, whose measurement is 37½ mill. My largest shell is only 32 mill, excluding the lip.

22. Helix monodon, Rackett. A rare shell in East Tennessee. Only two or three found.

23. Helix palliata, Say. A rare species. Half a dozen found.

24. Helix perspectiva, Say. An abundant species. Specimens from Monroe county are of a lighter color than those found in the valley of the Holston.

25. Helix Rugeli, Shuttleworth. A somewhat abundant species, variable in size; more variable in the valley of the Holston. Largest shell = 14½ mill. Smallest shell = 7¾ mill, largest diameter, lip excluded.

26. Helix Sayii, Binney, (Plate 12, figs. 5, 6, 7.) Two mutilated specimens of monstrous size, found on Chilhowee Mountains in Blount county, when presented to my notice seemed to deserve to be regarded as a distinct species bearing the same relations to *H. Sayii* that *H. major* does to *H. albolabris;* or as *H. Vancouverensis* does to *H. concava.* It was my intention to propose these shells as a new species under the name *Helix Chilhowëensis.* They differ from typical *H. Sayii* in having a cubic capacity more than five times as great, smaller or more rudimentary teeth, a wider development of the reflected lip on the base, and in several other less important details. The greatest diameter of the most perfect shell before me is about 1.40 inches. Dr. Binney (Terr. Moll. ii., 187) says of *H. Sayii*— "Transverse diameter commonly less than one inch; but there are specimens in the Philadelphia Museum from Mr. Hyde's collection, measuring one inch and three-quarters." This measurement exceeds that of my shell, and very likely refers to specimens indentical with it. Possibly the example of *H. major* may afford naturalists an excuse for regarding the shell of Chilhowee Mountains as distinct from *H. Sayii.*

27. Helix spinosa, Lea. A somewhat common, but by no means abundant species.

28. Helix stenotrema, Fer. Common, but not abundant.

29. Helix suppressa, Say. Less abundant than the preceding. Hill sides.

30. Helix thyroides, Say. Somewhat rare.

31. Helix tridentata, Say. Found, not abundantly, in the valley of the Holston. Largest diameter, according to W. G. Binney, 16 mill. My largest shell measures 21 mill, excluding the lip.

32. Pupa armifera, Say. Found in the vicinity of Little River? Smaller than Ohio shells. Rare.

33. Succinea avara, Say. A small variety. Rare.

## DESCRIPTIONS OF NEW FOSSIL SHELLS OF THE UPPER AMAZON.

BY T. A. CONRAD.

Mr. Gabb has described and figured in the fourth volume of the American Journal of Conchology a few species of fossil shells from a tributary of the Upper Amazon near Pebas. A larger number of species from the same group, collected by Mr. Hauxwell, has been sent to me by Professor James Orton, of Vassar College, to describe.

Prof. Orton remarks, "a very few of these shells were found where I first discovered the deposit, which was at Pebas, near the mouth of the Ambiyacu; but the rest, comprising nearly the whole collection, were obtained nearly 30 miles below Pebas, on the south side of the Marañon, at Pichua, just west of Cochaquinas. The locality is about 2200 miles up the Amazon, and the shells appear to be more abundant even than at Pebas. They occur in that peculiar formation of fine laminated colored clays which is spread over the entire valley of the great river, and which Prof. Agassiz had pronounced 'Drift.' Similar fossiliferous beds the natives say are to be seen at Omagua, and also up the Ambiyacu."

There are 7 species of the genus *Pachydon*, Gabb, which does not, so far as we know at present, have any living representative, and is very different from any known existing fresh water genus. In the collection are fragments of a singular bivalve, probably allied to *Mulleria*, one of which is pearly as a *Unio* and has a narrow elongated muscular impression, very different in size and outline from that of *Mulleria*. It seems to have been carried by a flood in some river of the time to its present position.

It is not possible to state without doubt what the relative stratigraphical position of this group may be, but if all the species are extinct it cannot be later than the Tertiary. The species being all new, or at least unknown in the books and cabinet of the Academy of Natural Sciences, the Pleistocene origin of the group is at least very doubtful. It may have lived either in fresh or brackish water, but it is certainly not of marine origin.

These fossils, judging from very small specimens of the stratum, were deposited on a clay bed in vast abundance, entire bivalves and univalves being mingled together among a multitude of fragments. It seems clear that they were not transported from a distance, but lived and died in the vicinity of the spot in which they are found, and near the shore of a large river or estuary, for the many fragments must have been washed from the shore among the living specimens. Most of these fossils, many of the small ones very delicate, are as perfect as when living, some specimens of *Neritina* and *Pachydon* retaining the epidermis, either whole or in part. When the valves of *Pachydon* are separated the shell is found to be filled with a drab colored sandy clay, holding minute scales of mica, and frequently ferruginous.

*Gasteropoda.*

ISÆA, Conrad.

Subulate; spire produced, apex slightly eroded; last whorl rounded, slightly umbilicated; aperture ovate, entire in front, peritome continuous, reflexed and prominent on the columella side.

This I presume to be a fresh water genus closely allied to *Tricula*, Benson. It differs only in the great prominence of the inner lip, which is nearly erect, and the more acute angle of the aperture. I should hardly have considered the fossil generically distinct from *Tricula* if it had been found in India, where the latter is living.

I. ORTONI, Gabb.—Pl. 10, fig. 10, 13.

*Mesalia Ortoni*, Gabb, Amer. Journ. Conch. vol. 4, p. 198.

Mr. Gabb has given a full description of this species, but his specimens were not perfect enough to show the peculiar character of the reflexed labium. The figure is of the natural size. Fig. 10 is an enlarged outline of what is supposed to be the young shell.

I. LINTEA, Conrad.—Pl. 10, fig. 6.

Turreted, rather widely subulate; whorls 6, regularly convex, with revolving raised lines, 6 or 7 on the penultimate, and about 8 on the last volution, with a minute intermediate line between some of the larger ones; the last whorl obtusely rounded at base; aperture oval.

LIRIS, Conrad.

Elongated, subcylindrical, with convex whorls and oblique lon-

gitudinal ribs; apex entire; aperture suboval, small, peristome continuous, labium reflexed and prominent.

This may be only a subgenus of the former, but the shell has more general resemblance to *Pupa* and is without an umbilicus. The aperture is proportionally smaller.

L. LAQUEATA, Conrad.—Pl. 10, fig. 3.

Subcylindrical, whorls 8, rounded, with oblique, thick, rounded, longitudinal ribs, which on the last whorl extend to the line of the angle of the mouth. The first and second whorls from the apex entire.

The figure is intended merely to indicate the size and proportions of the shell.

These two shells probably belong to the family *Melaniidæ*.

EBORA, Conrad.

Turbinate, columella much arched; peristome continuous, thickened; aperture notched at base.

This small shell is solid, and four specimens umbilicated, but one, the largest, is closed. I presume this to be a fresh water genus, but have no means of proving it.

E. CRASSILABRA, Conrad.—Pl. 10, fig. 14.

Turbinate, spire short, consisting of 4 whorls, which are rounded and smooth; last whorl broad and rounded.

Subgenus NESIS, Conrad.

Turbinate, with prominent revolving ribs; umbilical channel wide, extending to the base; labrum not thickened, slightly reflexed.

E. BELLA, Conrad.—Pl. 10, fig. 17.

Last whorl with 7 prominent revolving ribs, the intermediate spaces concave; spire consisting of 4 volutions, flat towards the apex, and having two ribs on each except the apicial whorl and the adjacent one, which are smooth; the apicial whorl is well defined but minute.

HEMISINUS, Swainson.

H. SULCATUS, Conrad.—Pl. 10, fig. 2.

Subulately turbinated, solid, polished, whorls slightly convex, revolving grooves or impressed lines not closely arranged, about six on the penultimate whorl, and two minute lines, one towards each boundary; last whorl with about 23 lines, which reach the base.

An elegant species, closely allied to *H. tenellus*, Reeve, but it has a longer last whorl and a narrower aperture.

This shell is very interesting, as it indicates a decidedly fresh water genus in this fossil group; a genus living in South American rivers.

DYRIS, Conrad.

Subulate, with many volutions; aperture ovate; labium reflexed.

The mouth of this shell is similar to that in the genus *Melania*, but the form and sculpture of the shell are very different from those of *Melania*.

D. GRACILIS, Conrad.—Pl. 10, fig. 8.

Very slender and elongated; whorls 8, convex, revolving lines carinated, very regular, 4 on the penultimate and 5 on the last whorl; about the sutures there is a rather wide indented space, whorls minutely and obliquely striated.

The figure is a rough outline, merely indicating the natural size.

NERITINA, Lam.

N. ORTONI, Conrad.—Pl. 10, fig. 5, 11.

Thick, transversely suboval; spire very small, of 3 whorls, last whorl flattened on top; aperture expanded; margin of inner lip very slightly concave, acute, densely and minutely plicated; labrum summit nearly on a line with the apex, which is entire, colored markings generally zigzag brown longitudinal lines.

*N. pupa*, Gabb (not Lin.), Amer. Journ. Conch. vol. 4, p. 197, pl. 16.

This species is widely different in form and size from *N. pupa*. Mr. Gabb had only young shells to describe from, but in the present collection are 15 specimens of various ages, figure 11 representing the actual size of a full grown shell. Fig. 5 represents a variation in the pattern of colored markings.

*N. pupa* is probably about one-third the size, and has not the flattened form of the area of the spire.

BULIMUS, Scopoli.

B. LINTEUS, Conrad.—Pl. 10, fig. 9.

Acutely ovate, thin in substance, whorls 5, those of the spire slightly convex, suture impressed; last whorl slightly carinated at the suture, elongated; surface minutely reticulated with rugose lines; columella arched, not plicated; peristome not preserved.

This is the only land shell in the collection, and there can be little doubt that it belongs to some section or subgenus of Bulimus, probably *Plectostylus*, Beck. The sculpture is so minute that it requires a lens to make it visible.

*Conchifera.*

Family *CORBULIDÆ.*

PACHYDON, Gabb.

The hinge of this genus is very similar to that of *Corbula*, much more so than to that of *Azara*, but the spiral beaks are in marked contrast to those of *Corbula*. When the left valve of *Corbula idonea*, Conrad, is compared with a corresponding one of *Pachydon tenuis*, they seem to be opposite valves, so widely different is their outline.

The pallial line is entire, not slightly sinuated, as Mr. Gabb has defined it. The nympha is minutely rugose.

The name *Pachydon* is objectionable, in consequence of its derivation being the same as *Pachyodon*, and I have been requested to substitute another. If naturalists object to Mr. Gabb's name, I would suggest *Anisothyris* (unequal valves) to take its place. Mr. Gabb referred this genus to the family *Isocardiidæ*, but, except in the turn of the beaks, there is nothing to suggest such an arrangement.

P. TENUIS, Gabb.—Pl. 10, fig. 1.

Subtriangular, very oblique, substance thick in adult specimens; right valve profoundly ventricose; umbonal slope slightly angulated, nearly terminal; posterior extremity truncated; cardinal tooth broad and thick, erect, curved, with an acutely angular margin; this tooth is overlapped in front by a carinated and sulcated projection; lunular depression profound, very large and broad.

*P. tenua*, Gabb, Amer. Journ. of Conch. vol. 4, p. 199, pl. 16, fig. 6.

This shell has a very thin, light brown polished epidermis.

P. CARINATUS, Conrad.—Pl. 10, fig. 7.

Triangular, very inequivalved, right valve profoundly ventricose, but flattened on the disk; posterior slope flattened, having an indistinct ridge in the middle, and forming nearly a right angle with the umbonal slope, which is slightly carinated; posterior extremity acutely angular; left valve prominently angular on the umbonal slope, concave anterior to it, and depressed on the

posterior slope, with a fine raised line in the middle of the slope; posterior ventral margin nearly rectilinear.

This shell is covered with a very thin, pale shining epidermis, and varies greatly from the typical species, *P. tenuis*. It is in perfect preservation, the 4 specimens in the collection having the valves connected as when living, and not the least abrasion visible.

P. OBLIQUIS, Gabb.—Pl. 10, fig. 15.

As Mr. Gabb has fully described this shell, I have only introduced it to show the two valves in connection, of the actual size of the largest specimen.

P. ERECTUM, Conrad.—Pl. 10, fig. 16.

Triangular; both valves ventricose, not oblique; anterior end oblique, truncated; posterior side produced, cuneiform, flexuous, extremity angular; ventral margin rounded; summits very prominent; cardinal tooth comparatively small.

There is only one specimen of this graceful species, the largest of the genus known. The valves are much less unequal than in the preceding species, and the erect beaks give it a very different contour from the other species. The character *oblique* should be omitted from the generic diagnosis.

P. CUNEATUS, Conrad.—Pl. 10, fig. 12.

Triangular, oblique, ventricose, solid, subequivalved; beaks terminal, summit very prominent and oblique; anterior end abrupt; posterior end subtruncated; disk somewhat flattened medially; umbonal slope rounded, undefined, nearly marginal; ventral margin nearly straight posteriorly; cardinal tooth oblique.

P. OVATUS, Conrad.—Pl. 10, fig. 4.

Ovate, slightly ventricose, disk of right valve regularly curved, of the opposite valve slightly flexuous towards the posterior end; beaks situated about one-fourth the shell's length from the end margin; summits narrow, prominent, oblique, anterior end angulated, the margin beneath obliquely truncated; ventral margin rounded; cardinal tooth directed slightly posteriorly, very erect.

This shell is somewhat similar in outline to *Cytherea convexa*, Say. It is white, polished and nearly equivalved, and is very unlike the other species in form.

P. ALTUS, Conrad. Plate 11, fig. 1.

*Description.* Cordate, inflated, nearly equivalve; summits prominent, angulated on the anterior margin; anterior submargin very oblique, slightly concave in outline, angulated,

terminal; area slightly depressed below the submargins, excavated beneath the beaks and umbones; posterior side subcuneiform; disk convex in the middle, posteriorly sloping in a nearly straight line to the end margin; extremity rounded, situated nearer to the summit than to the ventral margin.

This is the largest and most ventricose species, remarkable for having the shell silicified. The internal mould is of indurated ferruginous clay.

Plate 11, fig. 7. Outline of *Dysis gracilis*, enlarged.

Plate 11, fig. 8. Outline of *Isœa Ortoni*, enlarged.

## DESCRIPTIONS OF NEW TERTIARY FOSSILS, WITH NOTES ON TWO GENERA OF LAMELLIBRANCHIATA.

BY T. A. CONRAD.

### MACOMA, Leach.

M. SUBLINTEA, Conrad. Pl. 11, fig. 5.

Suboval or subtriangular, inequilateral, compressed; anterior side shorter than the posterior, subcuneiform; posterior dorsal margin slightly curved, oblique, regularly rounded at the extremity; ventral margin slightly curved; disk with minute concentric slightly impressed lines.

*Locality.* Vicksburg. Oligocene.

### ABRA, Leach.

A. PROTEXTA, Conrad. Plate 11, fig. 4.

Elliptical, elongated, inequilateral, compressed, sinuous; disk widely contracted.

*Locality.* Vicksburg. Oligocene.

Of this species one valve, the left, is all that I have seen. It is remarkable for its length.

### AXINÆA.

A. BELLA, Conrad. Plate 13, fig. 1.

Subovate, convex, equilateral; ornamented with fine, close, regular concentric lines; ribs prominent, acute and entire on the umbo and thence dividing into two, and sometimes three, narrow ribs; interstices with each a rib, and sometimes one or two lines, all which disappear on the umbo; marginal teeth narrow, numerous, closely-arranged; hinge series in two subequal continuous curves.

*Locality.* Day's Point, Virg. Miocene.

Among recent species the nearest approach to the *bella* is *A. parcipicta*, Reeve. Monog. fig. 14.

SPHÆRELLA.

Hinge of the right valve with three cardinal teeth, the two anterior teeth small, entire; posterior tooth rather elongated, parallel with the hinge margin and slightly grooved.

The above diagnoses shows a wide difference in this genus to *Diplodonta* or *Felania*. The muscular impressions are larger than those of the allied genera and the posterior cicatrix is much nearer the ventral margin. The posterior tooth described above may be said to coalesce with the adjacent tooth at the base. The left valve has one small direct cardinal tooth under the apex and an elongated, compressed, very oblique tooth, with a pit between them. All the species are subsphæroidal, and constitute a group of rounded bivalves with a profounder cavity than exists in any other genus.

There is one species in the Miocene of Virginia, one in the Oligocene at Vicksburg, and the recent *Lucina orbella*, Gould, is a species of *Sphœrella*, in which the muscular impressions are very large and unlike those in *Diplodonta*.

S. SUBVEXA, Conrad. Pl. 11, fig. 9. Hinge view.

ANODONTA.

A. DECURTATA, Conrad. Pl. 11, fig. 8.

Subtrapezoidal, inflated; umbonal slope abruptly rounded or subangular; posterior are depressed, wide; disk flattened medially; umbo obtusely rounded; posterior margin obliquely truncated.

*Locality.* Colorado.

This description is from a cast in a yellow arenaceous rock.

MELANIA, Lam.

M. DECURSA, Conrad. Pl. 13, fig. 5.

Subulate, volutions 10? slightly convex, penultimate volution sculptured with three distant, prominent, tuberculated, revolving lines, and a minute line between the two lines towards the suture; last volution with seven lines, two of them large and prominently tuberculated,; aperture ovate.

*Locality.* Accompanied the Anodonta, but the rock in which it occurs is a mixture of sand and shell fragments, in which many specimens of these shells are replaced by chalcedony.

CARYATIS, Roemer.

CYTHEREA CONVEXA, Say.

This Miocene species must retain Say's name *convexa*, which

I replaced by *Sayana*, in consequence of Brongniart having named a shell *C. ? convexa*, in "Des. Geolog. des Env. de Paris, par Cuv. et Brong." The figure of this shell reminds us of the genus *Cyrena*, especially as the specimens were associated with fresh water shells. It is certainly not a *Caryatis*, to which genus *C. convexa*, Say, belongs. No figure or description of the hinge of Brongniart's species is given.

The recent shell known by the name of *C. convexa* is distinct from the fossil shell of that name and was described by me under the name of *C. Sayana*, Sillm. Journ. vol. xxiii. It is easily distinguished from the former, as it is larger, more elevated and obtuse posteriorly. The fossil species, therefore, will stand as *Caryatis convexa*, and the recent as *Caryatis Sayana*. This genus of Roemer is a distinct and very natural group among the Veneridæ.

C. EXIGUA, Conrad. Pl. 11, fig. 3.

Subcordate, short and elevated, ventricose, thin in substance; summits prominent; posterior side truncated; lunule cordate, indistinctly defined.

*Locality.* Claiborne, Alabama. Rare. Eocene.

## NOTES ON LINGUAL DENTITION.

BY W. G. BINNEY AND THOMAS BLAND.

No. 2.

In studying the lingual membranes here described we have been greatly assisted by our friend Mr. Sam. Powel, of Newport, R. I. Many of the figures are drawn from photographs taken directly from the microscope by Mr. Powel.

GLANDINA ROSEA, Fer.

The specimen from which was extracted the lingual membrane here described was received from Mr. McNeil, who collected it in Nicaragua.

Lingual membrane long and narrow, with 36 rows of 25—1—25 teeth. Rows very oblique, running rapidly downwards and outwards from the centre for about two-thirds of their length, then curving upwards to the extreme margin. Centrals long, narrow, slightly incurved at the sides, emarginate at top, rounded at base, and bearing a short, blunt, stout, apical projection. Laterals entirely wanting. Uncini separated, thorn-shaped, their apices springing from a sheath which rests upon a long, narrow base; this base, seen from below, has in shape a strong resemblance to the sole of a boot. The uncini increase in size as they pass off laterally from the central line for about two-thirds of the way; they then commence rapidly to decrease in size; their sharp, thorn-like apices, however, are larger in proportion to the base of the teeth as they pass towards the outward margin.

Fig. 1.

Gl. rosea.

The figure shows one central and one of the uncini as seen from below.

Our figure was obtained in the same manner as that of *Megalomastoma bituberculatum*. See p. 213.

This membrane is interesting in showing the presence of a well developed central line of teeth.

It has been affirmed that the genus *Glandina* has no central line. M. Crosse has shown its existence in the European species. Mr. Morse has detected it in *Glandina truncata* and *G. Albersi*. (See Land and Fresh Water Shells of North America, Part I.)

LIMAX MAXIMUS, Lin.

The specimen figured in Invertebrata of Massachusetts, second edition, page 408, furnished the jaw and lingual membrane here described.

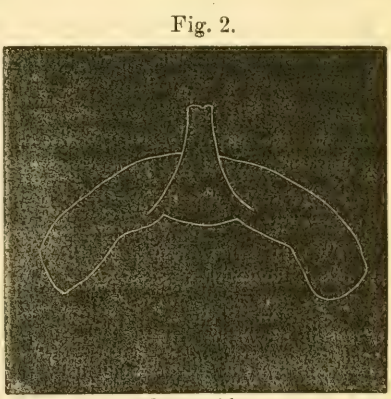
Jaw long, narrow, arcuate, strongly striated both vertically and transversely; ends attenuated; cutting edge with a prominent median projection.

The lingual membrane agrees perfectly with that of the allied species *L. flavus*, figured in Land and Fresh Water Shells of North America, Part I, p. 63, fig. 105.

Several individuals of *Limax maximus*, kept in confinement at this time, have been guilty of cannabalism. They devoured more than half of one of their kind before the crime was discovered.

HELIX TUMIDA, Pfr.

Fig. 2.



H. tumida.

We have already (Annals N. Y. Lyc., vol. ix, p. 283) described the lingual dentition and the jaw of *Helix tumida*. An opportunity has since occurred to examine other specimens of the same species. Finding the character of the jaw confirmed by these later examinations, we have given here a figure of the jaw. We described the jaw as long, narrow, slightly arched, blunt at ends, with a slight, broad, median projection; there is a long, narrow, conical projection springing upwards from about the centre of the anterior surface of the jaw, of the same color, material, and consistency as the jaw itself; this is not the muscular attachment which often adheres to the jaw after it has been extracted; jaw with delicate, distant, longitudinal striæ. To the above description we must add that the longitudinal striæ pass uninterruptedly from the jaw into this projection, showing the same continuity of structure.

The muscular attachment often adhering to the extracted jaw

of land mollusks has sometimes the longitudinal striæ extending from the jaw itself, but, as far as noticed by us, this muscular attachment is simply an extension of the upper margin of the jaw itself, while in *Helix tumida* the projection springs from a different part of the jaw.

HELIX ASPERA, Fer.

The specimen examined was received from Jamaica.

Jaw long, narrow, arcuate, of almost equal width throughout; ends blunt, but slightly attenuate; anterior surface with eight sharp, prominent, conspicuous ribs, strongly denticulating both margins.

Lingual membrane long and narrow, composed of numerous rows of about 41—1—41 teeth each. Centrals and laterals as usual in the genus. The upper edge of the plate of the centrals is decidedly divided into two equal lobes. In the laterals the same edge is straight, but narrower than the centre of the tooth. Uncini subquadrate, with one large short denticle, with a bluntly tricuspid point.

HELIX ACUTA, Lam.

The specimen figured was received from Jamaica.

Jaw arched, thick, long, narrow, of almost uniform width throughout, ends attenuated, blunt; anterior surface with seven distant, stout ribs, denticulating both margins.

Lingual membrane long and narrow, composed of numerous rows of about 40—1—40 teeth each. Centrals and laterals as usual in the genus. Uncini with apparently only one long, oblique denticle.

HELIX MUSCARUM, Lea. Plate 9, figs. 4 and 16.

Jaw long, narrow, arched, delicately striated; ends attenuated, bluntly rounded; no trace of anterior ribs, and no median projection to the cutting edge. See fig. 16.

Lingual membrane long and narrow, composed of numerous rows of about 75—1—75 teeth each. These rows are arranged *en chevron*, quite as much so as in the genus *Cylindrella*. Centrals long, narrow, curving inwards at the sides, so as to make the centre of the plates the narrowest part. The upper edge of the plates is slightly rounded. The lower edge is trilobed. The cutting cusp is placed at about one-fourth the distance from the lower to the upper edge of the plate. It is strongly trilobed, each lobe extending into a long, broad, stout, blunt denticle. The denticles do not extend beyond the lower edge of the plate. They are often much more broadly expanded than in the tooth figured. The central teeth are symmetrical. The laterals are

unsymmetrical, the lower edge of the plate not being developed on the side nearer the centrals, but thrown abruptly off towards the margin of the membrane; it is rounded and not trilobed like the lower edge of the centrals; the laterals are also longer, narrower, with a less expanded upper edge of the plates than in the centrals, in a contrary direction from which they are also thrown off by the irregular curving of the plates. The cusps and denticles on the laterals are the same as on the centrals. There are no uncini.

In one specimen were two abnormal rows along the whole length of the membrane, in which the cutting edge was divided into four instead of three lobes. These abnormal rows were separated by a normal line.

Fig. 4 shows one central and one lateral tooth.

HELIX ORBICULATA, Fer., (Pl. 9, fig. 14.)

Jaw striated, thick, short, broad, slightly arched; ends squarely truncated, scarcely attenuated; cutting edge irregular, but with no median projection. (See fig. 14.)

Lingual membrane long and broad, composed of numerous rows of about 47—1—47 teeth each. Centrals and laterals as usual in the genus, the cusp being greatly produced. The uncini are long and narrow, with a very greatly developed denticle, much longer and quite as broad as the tooth, divided into three lobes, of which the central is the largest. These uncini resemble the laterals of *Planorbis* more than the usual form of uncini in the genus *Helix*. The extreme uncini are more irregularly denticulated, but the denticles still preserve the obtuse, rounded form.

HELIX MICRODONTA, Deshayes.

The specimen examined is from Nassau, New Providence, Bahamas.

Jaw stout, long, broad, slightly arched; ends but little attenuated, bluntly rounded; with ten stout, broad ribs, crowded into the three inner fifths of the transverse diameter of the jaw, the outer fifth at each end being free from ribs; the ribs are visible on both anterior and posterior surfaces, and crenulate either margin.

Lingual membrane long and narrow, composed of numerous rows of about 20—1—20 teeth. Centrals and laterals as common in the genus, the plates subquadrate, the cusps rather short and stout. Uncini long, narrow, irregularly denticulated, as in figure of *H. tridentata* (L. and Fr. W. Sh. N. A., Part I., p. 130, fig. 220), but with shorter denticles.

HELIX SEPTEMVOLVA, Say.

Jaw long, narrow, slightly arched; ends attenuated, bluntly rounded; anterior surface with seven stout, distant ribs, crenulating the cutting edge.

Lingual membrane long and narrow. Teeth as usual in the genus. Centrals and laterals much longer than broad. Uncini long, stout, irregularly denticulated, as in the last described species.

HELIX TOWNSENDIANA, Lea.

Jaw with numerous stout ribs, visible both on the anterior and posterior surface, and denticulating both upper and lower margin.

Lingual membrane long and narrow, composed of numerous rows of about 40—1—40 teeth each. Centrals and laterals as usual in the genus. Uncini long and narrow, irregularly denticulated.

HELIX VARIANS, Fer.

The lingual membrane examined was extracted from a specimen received from Florida by the Museum of Comparative Zoology.

Lingual membrane with about 33—1—33 teeth in each row, arranged as usual in the genus. Teeth also as usual in the genus, the uncini being irregularly denticulated, denticles long and blunt.

The jaw of this species has already been figured by us, in L. & Fr. W. Sh., Part I., p. 185, fig. 325.

HELIX LORICATA, Gould.

Jaw long, broad, slightly arched, ends blunt, but little attenuated; with eleven broad, stout, crowded ribs, visible on both anterior and posterior surface, and crenulating either margin.

Lingual membrane with teeth like those of *Helix Townsendiana* already described.

HELIX INFLECTA, Say.

Jaw thick, short, broad, arched, of almost uniform width quite to the blunt ends; with fourteen stout, crowded ribs, visible on both anterior and posterior surface and denticulating either margin.

Lingual membrane with teeth not differing essentially from that of *Helix tridentata*, as figured in L. & Fr. W. Shells of N. A., Part I., p. 130.

HELIX REDIMITA, W. G. Binn., (Plate 9, fig. 11.)

Jaw stout, strongly arched, transversely striate in parts; ends

blunt, scarcely attenuated; with six prominent, sharp ribs, equally visible on both anterior and posterior surface, their ends strongly pectinating both margins. (See fig. 11.)

Lingual membrane long and narrow, with numerous rows of about 45—1—45 teeth each. Teeth as usual in the genus. (See fig. 308 on p. 176 of Land & Fr. Water Shells of N. A., Part I.) The bicuspid denticle on the uncini is still more developed than in that figure.

HELIX FIDELIS, Gray, (Plate 9, fig. 1, 9.)

Jaw short, broad, thick, rough, strongly arched, ends attenuated, blunt, cutting edge with a well developed blunt median projection, marked with decided longitudinal striæ, which crenulate its margin. (See fig. 1.)

Lingual membrane long and narrow, composed of numerous rows of about 48—1—48 teeth each. Centrals long, expanded at base, narrowed rapidly towards the apex, which is recurved and prolonged into a short, stout, conically pointed denticle, without decided lateral denticles. Laterals about 24 in number, much resembling the centrals in shape, but with decided lateral expansions or denticles to the recurved apex, that nearer the central line being the larger. Uncini about 24 in number, irregularly denticulated, usually with one large bifid or tricuspid denticle and two small denticles. The figure shows one central and one lateral tooth. (See pl. 9, fig. 9.)

HELIX HEMPHILLI, Newcomb, (Plate 9, fig. 3.)

Jaw thick, very much arched, of almost uniform breadth throughout; striate transversely and vertically; ends not attenuated, squarely truncated; cutting edge with a blunt, prominent, median projection.

Lingual membrane with about 20—1—20 teeth in each row. Centrals and laterals as usual in the genus. Uncini long, narrow, with one long blunt denticle and a second quite small one at its side.

HELIX COOPERI, W. G. Binn.

Jaw thick, slightly arched, ends attenuated, blunt; cutting edge with no median projection, but regularly crenulated by the ends of numerous broad, subobsolete ribs: these slightly developed ribs extend but a short distance from the cutting edge.

HELIX STENOTREMA, Fer.

Jaw long, rather broad, arched, ends not much attenuated, squarely truncated; anterior surface with eight stout ribs, denticulating both margins.

Lingual membrane with about 21—1—21 teeth in each row. Teeth not essentially differing from those of *H. tridentata.* (See Land and Fr. W. Shells of N. A. Part I., p. 130.)

HELIX TUDICULATA, Binney, (Pl. 9, fig. 7.)

Jaw thick, long, narrow, slightly arched; ends but slightly attenuated, blunt; anterior and posterior surface equally showing six stout, broad ribs, denticulating either margin.

Lingual membrane long and narrow, composed of numerous rows of about 50—1—50 teeth each. Centrals and laterals as usual in the genus. (See pl. 9, fig. 7.) Uncini as in *Helix facta.* (See Land and Fr. Water Shells of N. A., Part I., p. 176.)

One central and one lateral are given in the plate.

BULIMUS MULTICOLOR, Rang.

The specimen examined was preserved in the Museum of Comparative Zooology at Cambridge.

Jaw thick, greatly arched, ends attenuated, bluntly rounded; striate, but with no signs of ribs on the anterior surface, nor of median projection to the cutting edge.

Lingual membrane long and narrow, composed of numerous rows of about 40—1—40 teeth each. Centrals and laterals as usual in the genus. (See *Bulimulus sufflatus*, below.) Uncini small, subquadrate, with one long, stout, blunt denticle and one shorter one at its side.

BULIMUS HANLEYI, Pfr.

The specimen examined was collected in Brazil, by Mr. J. G. Anthony.

Jaw strongly arched, stout, striate transversely, of almost equal width throughout; ends but slightly attenuated, blunt; cutting edge with a broad, stout, striate median projection.

Lingual membrane long and narrow, composed of numerous rows of about 50—1—50 teeth each. Centrals, laterals and uncini as usual in the genus. (See *Bulimulus pallidior*, in Ann. N. Y. Lyc. vol. ix, p. 282).

BULIMUS MAGNIFICUS, Grat.

The specimen examined was received from Brazil, by the Museum of Comparative Zoology at Cambridge.

Jaw stout, long, slightly arched, narrow, of almost uniform width throughout; ends slightly attenuated, blunt; entire anterior surface covered with numerous stout blunt ribs, breaking the regularity of both upper and lower margins, but scarcely denticulating them.

Lingual membrane long, rather broad, composed of about

30—1—30 rows of teeth each. Centrals and laterals as in the last species. In the single membrane examined there appear no true uncini, the extreme teeth on the edge of the membrane being more nearly the same as the centrals than is usual in the genus.

BULIMUS ODONTOSTOMUS, Sowb.

The specimen examined was collected in Brazil, by Mr. J. G. Anthony.

Jaw long, narrow, slightly arched, smooth.

Lingual membrane broad, composed of numerous rows of about 34—1—34 teeth each. Centrals and laterals as usual in the genus. The uncini are long and narrow, with a long, oblique, stout, blunt denticle. The usual smaller denticle of the uncini does not appear to exist on the single membrane examined by us.

BULIMULUS SUFFLATUS, Gould. Plate 9, figs. 8, 13.

Jaw thin, long, narrow, slightly arched, composed of twenty-one separate plates; ends somewhat attenuated, blunt. (Fig. 8).

Lingual membrane long and narrow, with about 45—1—45 teeth in each row. Centrals, laterals and uncini essentially the same as in *B. pallidior*. (See Ann. N. Y. Lyc. vol. ix, p. 282). One central and one lateral are given in our figure 13.

BULIMULUS MARIELINUS, Poey.

The specimen examined was received from Florida.

Jaw short, broad, strongly arched above, moderately so below; ends attenuated, blunt; anterior surface with coarse longitudinal striæ, and with rib-like processes, scarcely elevated, but denticulating the cutting edge.

ACHATINA VIRGINEA, Lin.

The individual from which was extracted the lingual membrane here described was received from Aux Cayes, Hayti, by Mr. Robt. Swift.

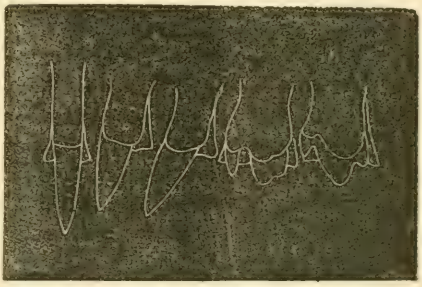
Lingual membrane long and broad, rounded at the anterior extremity, consisting of about two hundred transverse rows of teeth, each row containing at the widest point of the membrane about 40—1—40 teeth. Down the centre of the membrane is a well defined strip plainly visible to the naked eye, distinct from the balance of the membrane. This conspicuous strip consists of the central and lateral teeth, which are arranged in rectilinear rows, showing collectively in contrast to the uncini, which are in curving transverse rows for a small portion of their

length, then run diagonally to the outer edge of the membrane.

The narrowing of the membrane towards its extremity renders any enumeration of the number of teeth in any transverse row more than usually unsatisfactory.

The central teeth are on long, narrow plates, squarely truncated above and also below, where they are somewhat widened. These plates are delicately fringed or crimped, both at the upper and lower edge of attachment, as are also the plates of the laterals and uncini; but, as this fringing or crimping is very delicate, we have not attempted to show it in the figures. The plates of the central teeth bear upon their whole length a stout, broad denticle, wide as the plate itself at its upper edge, thence very gradually narrowing towards its base, from beyond which it projects into a long, blunt, stout, lance shaped point.

Fig. 3.



Achatina virginea.

The laterals are but two in number on each side of the centrals. They are of the same shape as the centrals, but are slightly wider, and the lance-like projections are shorter. They are almost equally symmetrical as the centrals, still the points of the projections are decidedly thrown towards the centrals, and the lower termination of the plates are more widely expanded on the side farther from the centrals. By these slight differences the laterals are made to bear the usual unsymmetrical appearance* in relation to the centrals.

There are two distinct forms of teeth among the uncini. The first form is borne by only the three teeth next the laterals. The plates of these are much broader than those of the laterals. The lance-like point of the laterals is replaced by two irregularly-shaped denticles, the outer one larger than the other. These are very variable in shape, and are smaller on the outer of the three uncini which bear them. In their most highly developed state they bear some rude resemblance to a mitten.

* In most of the *Geophila* the laterals on either side of the median line differ from the centrals by the suppression of a part of the centrals on their respective inner sides. Where the centrals are tricuspid, the laterals are either bicuspid or the third cusp of the centrals is suppressed wholly or in part on the side nearer the centrals.

The other form of teeth among the uncini prevails on the balance of the lingual membrane. The same long, broad plate is present, with its truncated upper edge, but its base is more produced and is widely rounded at the corners. The lance-like projection of the centrals and laterals, and the mitten-like process of the first three uncini, are entirely wanting. There is, indeed, a thumb-like projection on the side, but this bears no resemblance to that of the first three laterals; it is on the outer instead of inner side of the tooth, and is not a projecting point to the tooth. It is between the upper edge of attachment and the cusp, and is rather a spur thrown off from the last named process. This cusp is present in all the uncini except the first three. It is placed on the lower third of the tooth, from which it rises diagonally, expanding at the sides in keeping with the expansion of the plate, beyond which it projects considerably. It extends across the whole breadth of the tooth, and is best described as gouge-shaped. The spur mentioned above is somewhat spoon-shaped.

Fig. 4.

Achatina virginea.

All the plates on the membrane are well defined and distinctly separated.

Figure 3 gives the lower portion of one central, of the two adjoining laterals, and two of the first three uncini. Figure 4 gives one of the balance of the uncini, with sufficient portions of the adjoining ones to show their diagonal arrangement on the membrane. It is of great interest to compare with this membrane that of the allied species *Achatina fasciata*, which is given below. A recent opportunity of examining the lingual membrane of *A. fasciata*, shows that in that species there is great uniformity in all the teeth, the centrals and first three laterals do not in any way resemble those of *A. virginea.*

Figs. 3 and 4 are drawn from photographs taken directly from the microscope by our friend Mr. Sam. Powel. We have already (Land & Freshwater Shells, Part I., 312, fig. 364), figured the jaw of *Achatina virginea.* It is slightly arched, is attenuated at the ends. It is composed of separate plates, fourteen in the only specimen we have examined.

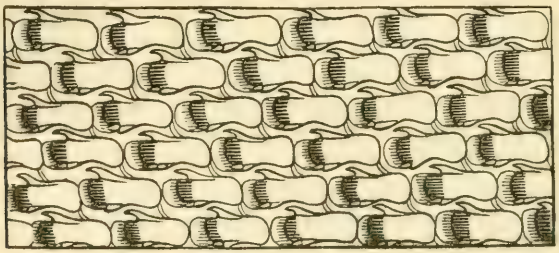
ACHATINA FASCIATA, Müll, (Pl. 9, fig. 6.)

A specimen received from Cuba furnished the lingual membrane here described.

Teeth about 69—1—69 in each row. Transverse rows arranged *en chevron.* Teeth almost uniform, the centrals hardly differing from the laterals except in being symmetrical, and in

having less expanded and produced cutting edges. Lower edge of base of attachment fringed. Our figure on plate 9, gives one central and one lateral tooth.

Fig. 5.



Achatina fasciata.

The figure here given was drawn by Dr. Leidy for the "Terrestrial Mollusks." (Vol. II., p. 270.) It represents the extreme laterals. There are no true uncini, or, judged by the lingual membrane of *A. virginea*, it is more correct to say there are no laterals.

It will be seen that *Achatina fasciata* resembles in its lingual dentition more nearly *Orthalicus zebra*, given below, than *Achatina virginea* given above.

ORTHALICUS ZEBRA, Müll, (Pl. 9, fig. 2.)

The lingual membranes examined are from specimens received by the Smithsonian Institution from the Sierra Madre, (See Land and Fr. W. Shells of N. A., Part I., p. 217, fig. 371.)

Central teeth long and narrow, the lower edge strongly corrugated; about three-fourths of the distance from the upper to the lower edge of attachment springs a gouge-shaped cusp, with convex cutting edge projecting considerably beyond the tooth. Laterals similar in shape, but unsymmetrical to the centrals, also rather broader, with more expanded cusps, whose cutting edge is convex. There seems no distinct uncini, but as the laterals become removed from the central line they are more distinctly separated, and bear the side spurs described in the membrane of *Achatina virginea* and *A. fasciata*, above.

There are about 50—1—50 teeth in each row, arranged *en chevron*.

The jaw of this species has been figured by us (in Land and Fr. Water Sh. of North Am., Part I., p. 215, fig. 367.)

The lingual membrane very nearly resembles that of *Achatina fasciata*, described above.

We have said there are no true uncini, but studied in the light

thrown on the subject by the lingual of *Achatina virginea* (see above) it may be that what we have called laterals are really uncini.

Our figure gives one central and one lateral tooth, and one detached extreme lateral from the other side of the lingual-membrane.

ORTHALICUS UNDATUS, (Plate 9, fig. 10, 12.)

A specimen received from Pear Island furnished the lingual membrane here described.

Teeth arranged as described in *Orthalicus zebra*, and about as numerous, one line counting 53—1—53 teeth.

Teeth in all essential points resembling those of *O. zebra*, (see above.) The centrals are broader than in that species and the uncini have a more expanded cusp.

Jaw strongly arched, ends attenuated, bluntly pointed, composed of twelve separate plates.

Figure 10 gives one central and one lateral tooth; fig. 12 gives one extreme lateral.

SUCCINEA EFFUSA, Shuttleworth, (Plate 9, fig. 15.)

A specimen from Florida preserved in the Museum of Comparative Zoology at Cambridge, furnished the jaw and lingual membrane here described.

Jaw strongly arched; ends blunt, attenuated; cutting edge deeply concave and furnished with a prominent pointed beak; anterior surface with vertical and horizontal striæ, but no grooves or rib-like processes; accessory plate large, subquadrate.

The lingual membrane resembles that of *S. avara*, figured in Land and Fr. W. Sh., I., p. 263. There appear to be about 15—1—15 teeth in each row. Our figure gives one central and one lateral tooth.

MEGALOMASTOMA BITUBERCULATUM, Sowb.

The specimen from which were extracted the jaw and lingual membrane here described, was received from Señor D. Rafael Arango, of Havana.

Jaw consisting of two subtriangular symmetrical plates, thickened towards the inner and lower edges, thinning outward and upward; with a decided thickened rim running parallel to the inner edge, and extending above and below the body of the plates; surface closely covered with oblique rows of small quadrate scales. Generally resembling the jaw of *M. cylindraceum*, figured in American Journal of Conchology, I., pl. 5, f. 2.

Lingual membrane long and narrow. Teeth 3—1—3, arranged in numerous chevron-shaped transverse rows. Centrals upright,

long, subquadrate, with incurving sides and base: apex broad, recurved, tricuspid, the median cusp prolonged into a beak-like point. First lateral long, narrow, irregular, oblique, with a recurved, tricuspid apex as in the central. Second lateral somewhat the shape of the first lateral, but shorter, less oblique and less irregular, its recurved apex produced into longer and more delicate beaks. Third lateral shorter, stouter, irregular, jaw-shaped, bearing on its inner or lower edge one median stout, and two terminal more slender beaks.

Fig. 6.

M. bituberculatum.

Figure 6 is drawn from a photograph taken directly from the lingual membrane by our friend Mr. Sam. Powel, of Newport, to whom we are indebted for much assistance in studying lingual membranes.

In our figure the teeth are separated from each other to clearly show their characters. On the membrane they are much more closely united.

HELICINA ORBICULATA, Say. (Plate 9, fig. 5.)

An opportunity of examining the lingual membrane of this species has lately been given us by Dr. E. R. Schowalter, of Uniontown, Alabama. We have examined numerous individuals received from him, and find several points of interest in them. The figure copied from Troschel in Land and Freshwater Shells of N. A., Part III., p. 108, does not give clearly the outline of the fifth lateral tooth.

We give a figure of this lateral as it appeared to us. (Plate 9, fig. 5.) There is considerable variation in the shape of these teeth, the basal expansion being often longer than in the one figured.

The uncini have long fringe-like points to the cusps of their recurved apices. The outer uncini have more than three cusps: we have counted distinctly four and six on some.

The uncini are very numerous, more than fifty on each side of the membrane.

## Reference to Plate. IX.

Fig. 1. *Helix fidelis.* Jaw.
2. *Orthalicus zebra.* One central with its adjacent lateral, and one detached extreme lateral from the other side of the membrane.
3. *Helix Hemphilli.* Jaw.
4. *Helix muscarum.* One central and one lateral tooth.
5. *Helicina orbiculata.* The fifth lateral tooth.
6. *Achatina fasciata.* One central and one lateral tooth.
7. *Helix tudiculata.* One central and one lateral tooth.
8. *Bulimulus sufflatus.* Jaw.
9. *Helix fidelis.* One central and one lateral tooth.
10. *Orthalicus undatus.* One central and one lateral tooth.
11. *Helix redimita.* Jaw.
12. *Orthalicus undatus.* One extreme lateral tooth.
13. *Bulimulus sufflatus.* One central and one lateral tooth.
14. *Helix orbiculata.* Jaw.
15. *Succinea effusa.* One central and one lateral tooth.
16. *Helix muscarum.* Jaw.

## ON THE SHELLS OF THE HOLSTON RIVER.

BY JAMES LEWIS, M. D.

The Holston River rises in the mountainous regions of the western parts of Virginia and North Carolina. Flowing in a south-westerly direction through Eastern Tennessee, it receives numerous tributaries, one of which, the Clinch River, is a stream of nearly equal magnitude with the Holston, and at its junction with the Little Tennessee River (a stream of some size, rising in the south-western part of North Carolina), merges into the Tennessee River, which is properly but a continuation of the Holston under another name. In all the considerable streams which are united in this system of drainage, is a common fauna, varied locally by species which are not common to the whole system.

During two years past, a portion of the Holston River, extending from Little River Shoals to Chota Shoals, a distance of about 20 miles, has been explored by Miss Annie E. Law, of Concord, East Tennessee, and the various species of mollusca collected by her are the principal subject of the following notes, to which is appended a supplementary list of shells quoted by writers as found in the Holston River and at Knoxville. This, it is presumed, embraces all or nearly all that can be profitably suggested respecting the shells of the Holston from the knowledge we have of them at the present time. Before entering upon the consideration of species, it may be proper to remark that certain shells which heretofore have been quoted as found in the Holston have not so occurred in Miss Law's explorations. In reply to inquiry, Miss Law remarks, in a recent letter, "I have never found *Goniobasis* in the Holston. . . It seems to belong exclusively to small streams. Neither have I detected any among the shells found in Indian Mounds, nor among the vast beds of fossil shells washed up by the great freshet three years ago."

A small bivalve shell, described by Mr. Lea under the name *Margaritana Holstonia*, and referred to the Holston, has not been found by Miss Law in the Holston, but is somewhat abundant in some of the small streams of Monroe County.

Possibly conditions may have changed within a few years; but it seems to me more reasonable to surmise that localities have not always been accurately stated by collectors, and the descriptive naturalist has often located his species by conjectures based upon their association in a package, rather than from positive statements, which correspondents sometimes forget to furnish.

I have endeavored, through Miss Law's assistance, to obtain such information as would serve to render our knowledge of distribution reasonably accurate. But it may be presumptuous to suppose that a *perfect* series of notes on the species of so large a stream as the Holston might be the result of explorations made in so short a time as two years.

In the following notes I have been governed mostly by my own convictions. In a few instances I have deferred to the opinions of others whose more extended acquaintance with species entitle their views to consideration.

UNIONIDÆ.—[Catalogue and Notes.]

1. *Unio Æsopus*, Green.
2. " *alatus*, Say.
3. " *arcæformis*, Lea.
4. " *Barnesianus?* Lea. Two specimens, hardly mature, are all that have been seen. Mr. Wheatley suggested the species might be *U. Greenii*, Con. That species, however, belongs to a different system of drainage (Alabama River). The shells under consideration agreeing very nearly with Mr. Lea's description of *U. Barnesianus*, I have provisionally adopted that name for them.
5. " *biangulatus*, Lea.
6. " *brevidens*, Lea.
7. " *cælatus*, Con. On the authority of Mr. Wheatley.
8. " *caperatus*, Lea. Regarded sometimes as a variety of *U. dromas*, Lea; it seems to me to be a good species.
9. " *capsæformis*, Lea.
10. " *circulus*, Lea.
11. " *Clinchensis*, Lea. My determination of this somewhat common species may be questioned.
12. " *Conradicus*, Lea. Two young specimens, supposed to be *Conradicus*, may prove to be *subtentus*, Say.
13. " *Cooperianus*, Lea.
14. " *cornutus*, Barnes.
15. " *crassidens*, Lamarck.

16. *Unio cuneolus*, Lea. Shells regarded as *cuneolus* are at present somewhat uncertain.
17. " *cylindricus*, Say.
18. " *dolabelloides*, Lea. Mr. Lea changes the orthography in recent references to this species.
19. " *dromas*, Lea.
20. " *ebenus*, Lea.* Among Miss Law's earlier shells were specimens regarded as *ebenus*, which at a later date were identified as *Lesueurianus*, Lea, no doubt synonymous.
21. " *Edgarianus*, Lea. Not abundant.
22. " *elegans*, Lea.
23. " *fabalis*, Lea.
24. " *foliatus*, Hildreth. Three specimens found at Little River Shoals at various times.
25. " *glaber*, Lea. A rare species.
26. " *glans*, Lea. " " "
27. " *gibbosus*, Barnes. Common.
28. " *gracilis*, Barnes.
29. " *Haysianus*, Lea. *U. Sowerbyanus*, Lea, is, no doubt, a sexual counterpart.
30. " *Holstonensis*, Lea. A single specimen, apparently this species, is all that has been found.
31. " *intermedius*, Con. A common species in the Holston and Clinch Rivers. Besides the common form, I have a single specimen which varies notably, and which, if not abnormal, may prove to be a distinct species.
32. " *iris*, Lea. Two specimens, only, have been seen; doubtfully identified.
33. " *irroratus*, Lea.
34. " *Lesleyi*, Lea. Not abundant.
35. " *ligamentinus*, Lam.
36. " *metanever*, Raf.
37. " *monodontus*, Say.
38. " *Mooresianus*, Lea.
39. " *multiradiatus*, Lea. This, I think, includes *U. perradiatus*, Lea.
40. " *mytiloides*, Raf. *Fide* C. M. Wheatley.
41. " *ovatus*, Say.
42. " *patulus*, Lea. A single specimen.

* Many of the species common in Ohio and other Western States are *smaller* in the Holston River. This remark does not apparently apply with more force to *ebenus* than to several other species.

43. *Unio pernodosus*, Lea. Two specimens. It is apparently a good species.
44. " *perplexus*, Lea.
45. " *perradiatus*, Lea. Retained in deference to Mr. Wheatley. (See *multiradiatus*).
46. " *phaseolus*, Hildreth.
47. " *plenus*, Lea.
48. " *propinquus*, Lea. Abundant.
49. " *pudicus*, Lea. The young shells appear to me to be *pudicus;* the mature ones bear a strong resemblance to *U. Lyonii*, Lea. My determination is questionable
50. " *pustulosus*, Lea.
51. " *Pybasii*, Lea. Occurs also in small streams.
52. " *Ravenelianus*, Lea. A single specimen. May not be correctly determined.
53. " *rectus*, Lam.
54. " *securis*, Lea.
55. " *sparsus*, Lea A single well characterized specimen.
56. " *Stewardsonii*, Lea.
57. " *subtentus*, Say.
58. " *tenuissimus*, Lea.
59. " *tesserulæ* Lea. A single immature shell; determination questionable.
60. " *triangularis*, Barnes.
61. " *tuberosus*, Lea. Occurs in the Holston, Clinch and Tennessee Rivers with a more inflated form than is seen in typical specimens.
62. " *undulatus*, Barnes.
63. " *varicosus*, Lea.
64. " *verrucosus*, Barnes.
65. *Margaritana dehiscens*, Say. Rare.
66. " *marginata*, Say.
67. " *rugosa*, Bar. Rare.
68. *Anodonta oblita?* Lea. A single small specimen. Determination doubtful.

*Univalves*, (in alphabetical order).

69. *Aneulosa Cincinnatiensis*, Lea. In presenting my opinions on the species I am now considering, it may be well to premise that I began the study of the Strepomatidæ of the Holston River strongly impressed with the correctness of Mr. Tryon's determinations and synonymy, and with a desire to profit by his then unquestioned advantages. After a very thorough study of an immense number of specimens, of different ages and varieties, I arrived at results which are as follow:

In 1838 Mr. Lea described and figured a shell from the Ohio River, under the name of *Melania Cincinnatiensis*. I have specimens from the Holston River that *exactly* conform to the terms of his description, and among them are specimens that might be substituted for the specimen that was the original of his figure. At a later date Mr. Lea described the mature shell as *Anculosa tintinnabulum*. In the series of specimens by which I unite *Cincinnatiensis* and *tintinnabulum*,* the smallest is less than 0·08 inches in diameter, being about half as large as the original "*Mel. Cincinnatiensis.*" The series progresses through a large number of individual specimens to the largest adult *tintinnabulum*. I feel assured that identification was never more complete.

Mr. Tryon in his synonymy and elsewhere expresses the opinion that *Mel. Cincinnatiensis*, Lea, is the young of *Anculosa prærosa*, Say. Some of the varieties (so called) of *Anculosa prærosa*, have bicarinate young, but their *forms* are such that when of the dimensions of Mr. Lea's typical *Cincinnatiensis* (diameter 0·16 inch) they *do not exactly*, but only *approximately*, correspond thereto, and therefore must yield to the claims of *tintinnabulum*.

Having conclusively ascertained that the young of *Anculosa tintinnabulum* are *bicarinate* and *exactly* correspond to Mr. Lea's figure of *Mel. Cincinnatiensis*, it remains now to compare these young specimens with the young of *Anculosa subglobosa* of corresponding size; if there is *perfect* agreement, Mr. Tryon's synonymy of *subglobosa* (which includes *tintinnabulum*) may be allowed to pass unquestioned. If there are *very conspicuous* and *constant* differences it seems to me that these, considered in connection with the constant differences I observe in the adults, imply they are distinct species. My specimens of *A. subglobosa* embrace numerous specimens from $\frac{1}{8}$ inch diameter to the full grown adult, none of which are carinate, nor can I find *any* evidence by which I might identify *subglobosa* with *tintinnabulum*.

70. *Anculosa prærosa*, Say. There are clearly as many as ten or twelve well marked and constant varieties (?) referable to this species. The differences in some of these are remarkable, and are not confined to the adult specimens. Of some of these varieties I have very small specimens. In one variety carinæ are scarcely discernible in the smallest specimens. In others there are traces of carinæ upon shells of nearly or quite $\frac{1}{4}$ inch in

* With reference to my position in this matter, I will remark that Mr. U. P. James, of Cincinnati, finds *A. tintinnabulum* in the Ohio River. I have a single specimen from the Ohio River, labeled "*prærosa*" by Mr. Wheatley.

diameter. Possibly in some of the most marked instances these differences might be regarded as specific. From all I can learn, I infer some of the varieties of *A. prærosa* occupy isolated stations, not being mingled together indiscriminately. This inference seems to be confirmed by the occurrence of a very well characterized variety at a point on the Tennessee River from which Mr. Wheatley has numerous specimens.

71. *Anculosa subglobosa*, Say. This species is somewhat rare in the Holston, but occurs in considerable numbers in Little River. The young are smooth, shining, depressed, subglobose, with a somewhat pointed, elevated apex. The outer lip differs constantly from that of *Cincinnatiensis* (= *tintinnabulum*, Lea). The young shells also very decidedly differ from those of *Anculosa* (Mel.) *virgata*, Lea, which Mr. Tryon has placed in the synonymy of *subglobosa*.

72. *Anculosa Tryoni*, Lewis. Plate , fig. . Shell pear-shaped, with the apex somewhat broadly and regularly rounded; wider and subconstricted below; suture slightly impressed on the apicial whorls, more conspicuously impressed below; apex, in very young shells, a minute, elevated, dark point, which at later stages of growth is lost by erosion, usually leaving a minute axial pit; whorls 3 (to 4 ?)* rapidly enlarging; aperture outwardly somewhat regularly rounded from the slight constriction below the suture to the base—acutely angular above, subangular below; outer lip sharp, thicker within; pillar much thickened, having a subtubercular calcareous deposit near the superior angle of the aperture; plane of the aperture nearly regular, and obliquely inclined to the axis. Color variable—yellow, orange, olivaceous, purple or brownish. Bands many, two or none; sometimes visible within when obsolete without. Length 0·90 inch. Width 0·60 inch. Aperture nearly $\frac{2}{3}$ the length of the shell.

In Conch. Jour. vol. ii, page 133, figures 101, 102, Mr. Tryon presents varieties of this species, as *Anculosa tæniata*, Con. *A. tæniata* is, perhaps, a smaller species than *A. Tryoni*, less varied in form, color and bands, and also exhibits peculiarities in the arrangement and modification of the bands not observable in *A. Tryoni*. The suture and also the form of the whorls are different. Occasional specimens of *A. tæniata* are somewhat disposed to exhibit broad, slightly elevated, revolving lines on their surfaces. This feature is absent in *A. Tryoni*, which may be characterized as a smooth species. *A. tæniata* also belongs to a different system of drainage, viz., the Alabama River and its trib-

* The apex of the adult specimens is usually considerably eroded.

utaries. There are *small* shells (a variety of *A. Tryoni*) in the Holston which likewise differ from the Alabama River shells. *A. Tryoni* is found abundantly near Concord.

73. *Anculosa virgata*, Lea. I have no difficulty in identifying certain small shells of the Holston by Mr. Lea's figure and description of *Melania virgata*. Mr. Wheatley has the same species from the Tennessee River, which he calls "*Anculosa vittata*, Lea," his specimens being possibly a little larger and less perfect than those found in the Holston. In my Catalogue of the Shells of the Coosa River I included *Anculosa vittata*, Lea, quoting from Mr. Lea's "Observations." Later, I have from Dr. Schowalter (who furnished Mr. Lea original specimens of *A. vittata*) a statement of error of locality, which he corrects by stating that *A. vittata* was not found in the Coosa, but in a smaller stream, a tributary of the Coosa. I am persuaded that *A. vittata* can scarcely occur in two systems of drainage so distinct. If, however, such is found to be the case, *vittata* will unquestionably yield priority to *virgata*. Miss Law informs me that *A. virgata* is found on one of the dams at Little River Shoals, and is attainable only under difficulties. She has found it in no other locality. It differs in *habit* from *Anculosa subglobosa*, Say, with which Mr. Tryon has united it in his Synonymy and elsewhere.

74. *Ancylus* ? An abundant species on the rocks in the Holston. I have not been able to identify the species, but have no doubt so common a species may long since have been described.

75. *Angitrema verrucosa*, Raf. A common and somewhat variable species in the Holston, Clinch and Tennessee Rivers. Immature specimens that agree with Mr. Lea's figure of *Melania Holstonia* are not rare. Smooth specimens sent to Mr. Wheatley were returned by him as *Lithasia fuliginosa*, Lea. I am not acquainted with that species, but by a comparison of Mr. Lea's figure of it I am unable to identify my shells with it.

76. *Eurycœlon Anthonyi*, Redf. Found somewhat abundantly on *Chota Shoals*, but is quite rare in other portions of the Holston examined by Miss Law. I have a single specimen of this variable species that sufficiently resembles Mr. Lea's figure of *Lithasia Tuomeyi*. Others resemble his figure of *Anculosa turbinata*. This species grows larger in portions of the Tennessee River reached by Mr. Wheatley's correspondents. Miss Law has found very large specimens of this species in Indian Mounds, showing that in former times it probably attained a much greater development than at the present day.

77. *Io brevis*, Anth.

78. *Io spinosa*, Lea.

79. *Io turrita*, Anth. Mr. Lea, in a letter relative to *Io*, expressed a doubt if there were more than one species of spinous *Io*. I infer he would include all the spinous species under *fluvialis*, Say. In this opinion I am disposed to coincide with him, considering the varieties of *Aneulosa prærosa*, Say (which afford a parallel), a good precedent. I observe in Miss Law's shells some peculiarities which I think have not been noted. *Io brevis* has the first four whorls of perfect specimens smooth. *Io spinosa* has tubercles on all the upper whorls. *Io turrita* has undulations terminating in tubercles, on the upper whorls. I quote from Miss Law's letters the following interesting remarks: "The muscular power of *Io* is astonishing. I frequently find one adhering to a rock half as large as my head, and when I take up the shell it brings the rock with it, and requires much force to separate it." *Io* is not confined to the Holston, as might be inferred from the recorded statements of its habitat. Miss Law has sent me specimens from the Clinch River. Mr. Wheatley has specimens from the Tennessee River. I have no doubt it will also be found in the Little Tennessee River, and possibly in other considerable streams that form part of the same system of drainage.

80. *Melantho ponderosus*, Say. I change the adjective termination for grammatical reasons. This species does not attain as great size in the Holston, nor is it as abundant as in the Tennessee River.

81. *Physa Saffordii*, Lea. Possibly not correctly determined. The shells collected by Miss Law are probably quite abundant.

82. *Somatogyrus Currierianus*, Lea. I have from Miss Law numerous shells identical with *Somatogyrus parvulus*, Tryon, found, at very low stages of water, in little pools left by the receding water along swift, shallow, gravelly portions of the Holston. Less abundantly, a somewhat larger shell agreeing with *S. aureus*, Tryon. Also larger shells identical with "*Amnicola Currieriana*, Lea," found in still water, along muddy portions of the Holston, near the shore. They are, without doubt, different ages of one species. Mr. Lea's name for the species takes precedence.

83. "*Strephobasis Clarkii*," Lea. Near Concord, somewhat abundant. Varieties approximate "*Mel. plena*, Anth.," and suggest a doubt whether *S. Spillmanii*, Lea, should be regarded as a synonym of *plena*. I have a specimen of *S. corpulenta*, Anth., to which the same remark will apply.

84. *Strephobasis corpulenta*, Anthony.* Little River Shoals. Rare. I have young specimens of this species that closely resemble Mr. Lea's figure of *Trypanostoma napoideum*.

85. *Strephobasis Lyonii*, Lea. Little River Shoals. Abundant.

86. *Trypanostoma affine*, Lea. I admit this species in deference to Mr. Wheatley.

87. *Trypanostoma canaliculatum*, Say.

88. *Trypanostoma curtum*, Hald. Recorded by Mr. Tryon as *Strephobasis curta*, Hald. Dr. Hartman, basing an opinion on the form of the opercle, and its connection with the proligerous lobe, is disposed to regard this species as a *Trypanostoma*. The species is remarkable for its numerous varieties, many of which appear to be entirely local, as has been remarked of *Anculosa prærosa*, Say.

I venture to suggest the following synonymy, not as being entirely conclusive, but as being in many particulars deserving of inquiry:

*Trypanostoma curta*, Hald. Dr. Hartman's MSS.

*Melania curta*, Hald. Date? Locality?

†[H.] *Melania turgida*, Lea. June 18, 1841. Young short and wide; apex entire. (L.)‡

[H.] *Melania picta*, Lea. June 18, 1841. Banded variety. (L.)

*Melania solida*, Lea. May 2, 1845. Adult, wide and solid; apex eroded. (L.)

*Strephobasis solida*, Lea. April 16, 1861. *Mel. solida*, Lea, redescribed. (L.)

*Trypanostoma simplex*, Lea. April 15, 1862. Young shells; no bands. (C. M. W.)

*Trypanostoma minor*, Lea. April 15, 1862. Young shells; no bands; var. (C. M. W.)

§ *Trypanostoma pumilum*, Lea. April 15, 1862. Banded, slender var.; Ohio River. (L.)

*Trypanostoma bivittatum*, Lea. April 15, 1862. Two banded, young. (C. M. W.)

[H.] *Trypanostoma trochulus*, Lea. April 15, 1862. Wide, young; apex entire. (L.)

* Recent specimens raise grave doubts if the shells here referred to are satisfactorily determined.

† Species credited to the Holston are preceded by the letter H.

‡ L. = Lewis. C. M. W. = Wheatley.

§ I have specimens from the Holston River, labeled *Try. pumilum*, Lea, by Mr. Lea.

*Trypanostoma moriforme*, Lea. April 15, 1862. Constricted on middle of whorl. (C. M. W. & L.) (Two species confounded?)

* *Strephobasis olivaria*, Lea. June 3, 1863. Adult; slender variety. (L.)

*Strephobasis Hartmaniana*, Lea. [1870, MSS.] Slender, solid variety; Tenn. R. (C. M. W. & L.)

If the above synonymy should be verified, the question of priority lies between *Mel. curta*, Hald., and *Mel. turgida*, Lea.

89. *Trypanostoma filum*, Lea. Not very abundant.

90. *Trypanostoma gradatum?* Anthony. A beautiful light yellowish brown shell of 7 or more whorls, with a remarkably twisted columella. The young shells have been confounded with *Strephobasis corpulenta*, Anth., from which they differ principally by the prolongation of the anterior portion of the outer lip. The shell at all ages has much the aspect of a *Strephobasis*, but the form of the lip is that of *Trypanostoma*. My specimens are much larger than the recorded dimensions, and may be undescribed. Found on Little River Shoals. Rare. Identification not entirely satisfactory.

91. *Trypanostoma ligatum?* Lea. A few specimens only have been seen, from Little River Shoals. Not authoritatively determined.

92. *Trypanostoma moniliferum?* Lea. Not many.

93. *Trypanostoma parvum*, Lea. Little River Shoals and Little River. More numerous in Little River. Specimens presented to Mr. Lea were pronounced by him larger than his original specimens.

94. *Trypanostoma ponderosum*, Anth. I follow Mr. Wheatley in adopting Mr. Tryon's synonymy of this species. Fine specimens, identical with Mr. Lea's figure of *Try. dux*, are not uncommon.

95. *Trypanostoma undulatum*, Say. With some hesitation I admit this species among the Holston River shells, confessing my inability to recognize it.

The following notes relative to habits and distribution, taken from Miss Law's letters, are of interest, and refer principally to Little River Shoals:

"*Anculosa* [*A. prærosa* and *A.* '*tintinnabulum*,' Lea] and *Angitrema* [*A. verrucosa*, Raf.] are everywhere tolerably abundant in swift, shallow water. *Anculosa virgata*, Lea, I have seen nowhere but on the dam in the south part of the Holston [at Little River Shoals]; *Strephobases* are scattered throughout the

* I have an *original specimen* from Mr. Lea.

shoals. *Trypanostoma*, in still water, near the banks, and *Io* only where the water is very rapid. *Eurycœlon* is scarce here, and affects sheltered crevices among the rocks, eschewing mud entirely."

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Supplementary List of Species quoted from printed records as "found in the Holston," not yet received from Miss Law as being found in that stream:

*Unio amœnus*, Lea; *U. argenteus*, Lea; * *U. compressissimus*, Lea; *U. Copei*, Lea; *U. fassinans*, Lea; *U. mœstus*, Lea; *U. perpictus*, Lea; *U. pilaris*, Lea; *U. puniceus*, Hald.; † *Margaritana Holstonia*, Lea; ‡ *Goniobasis simplex*, Say; § *Goniobasis, glabra*, Lea; *Gon. striyosa*, Lea (*Try. striyosum*, Tryon); *Io fluvialis*, Say; *Io inermis*, Anth.; *Trypanostoma Roanense*, Lea; *Trypanostoma subrostratum*, Lea.

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Species quoted from printed records as found at Knoxville, not yet received from Miss Law as being found in the Holston:

*Goniobasis Stewardsoniana*, Lea; || *Gon. Estabrookii*, Lea; *Trypanostoma Knoxvilliana*, Lea; *Try. prasinatum*, Con.; ¶ *Try. subulæforme*, Lea.

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At Chota Shoals Miss Law found specimens of a variety of *Anculosa*, which Mr. Lea refers to "*tintinnabulum*." The shells have *nearly* the form of that species, but are remarkable for a beautiful greenish mottled appearance, unlike that of any other shells I have seen from any portions of the Tennessee system of drainage. They also have a remarkably thin and tender epidermis, which is readily removed in cleaning by treatment that does not similarly affect other shells of the Holston. Until more information can be obtained respecting them, it is scarcely proper to present them with the expectation that they will be received as a new species.

*Mohawk, N. Y., Oct.* 24, 1870.

* The habits of *U. compressissimus*, as stated by Mr. Lea in describing this species, may have kept it from Miss Law's observation.

† *Marg. Holstonia*, Lea, occurs in small streams in Monroe and possibly also in Blount Co.

‡ Shells that I have regarded as *Gon. Saffordii*, Lea, very like Mr. Tryon's figures of *G. simplex*, occur in Turkey Creek, near Concord.

§ *Gon. glabra* occurs in small streams in *Monroe Co.?*

|| The ferruginous coating mentioned by Mr. Lea in his remarks on this species is common to shells from *creeks* in East Tennessee.

¶ *Try. subulæforme*, Lea, occurs in Turkey Creek, near Concord.

# ON THE LIMPETS: WITH SPECIAL REFERENCE TO THE SPECIES OF THE WEST COAST OF AMERICA, AND TO A MORE NATURAL CLASSIFICATION OF THE GROUP.

BY W. H. DALL, SMITHSONIAN INSTITUTION.

Malacologists have long felt the need of a revision of the *Cyclobranchiata* of Cuvier. In this paper the results of a careful examination of a large number of species are detailed, and an approximation to a more natural classification of the Limpets has been attempted. The task has been by no means easy, yet it is hoped that some light has been thrown upon the subject, and the way made easier for the application of information which may be gleaned in the same field by other authors.

## *Historical Notes on the Nomenclature.*

Throwing out the more incongruous forms which were included in the genus Patella of Linnæus, we find the majority of the patelliform shells included by Cuvier (1817) in his order *Cyclobranchiata*. Lamarck (1818) placed them among his *Phyllidiens*. Férussac (1819) with a clearer perception of their characters, adopting *Cyclobranchiata* as the name of an order, formed for the Patellidæ a suborder, *Schismobranchia*,* placing the chitons in another, which he called, after Blainville, *Polyplaxiphora*.†

Latreille (1825) divided the *Cyclobranchiata* into two families, (*Scutiformes* and *Lamellés*) corresponding to the sub-orders of Férussac, except that in the former he unwisely included with the Patellæ, the genus *Umbraculum*, Schum. (*Umbrella*, Lam.)

Blainville, in the same year, used the terms *Schismobranchiata* and *Cyclobranchiata*, to include heterogeneous and unnatural groups of other mollusks, while he formed an order, *Cervicobran-*

* Not *Schismobranchia*, Blainv., *Schismobranchiata*, Blainville, Risso; nor *Schismatobranchia*, Gray.

† Afterwards corrected by Gray to *Polyplacophora*.

*chiata*, including two families; (1.) *Retifera* for the *Patellidæ*, and (2.), *Branchifera* for *Fissurella*, *Parmaphorus* and *Emarginula*. He also unfortunately transferred the chitons to his "Sub-type" *Malentozoäria*, which last was composed of the Cirriped crustaceans (*Nematopoda*) and the Chitons (*Polyplaxiphora*).

Rang in 1829 considered the *Patellidæ* and *Chitonidæ* as forming an order, for which he adopted Cuvier's name *Cyclobranchiata*.

Later, Gray (Guide to the Mollusca, 1857), placed the Limpets in two sub-orders—*Cervico-* and *Cyclobranchiata* forming part of his order, *Scutibranchiata*, sub-division *Heteroglossa*. The *Cervicobranchiata*, however, contains two families, the *Gadiniidæ* and the *Lepetidæ*, which cannot be affiliated with the typical members of the group.

The Messrs. Adams (Gen. Rec. Moll. 1858) however, must receive the palm for combining under one sub-order (*Edriopthalma*, but not=*Edriopthalma*, Gray) of the *Scutibranchiata*, a more heterogeneous collection of families, including the Limpets, than any other author (except their copyist, Chenu) has dreamed of doing. It cannot be said that any of these classifications were an improvement upon that of Férussac.

In 1861 (Wieg. Arch. II) Dr. F. H. Troschel proposed for the group of which the Limpets are the typical examples, the term *Docoglossa*, or plate-toothed. This was more fully defined by him in 1866, in the first part of the second volume of the "Gebiss der Schnecken," page 10. Though what would appear to be a want of appreciation of other and equally important characters, however, the Chitons and Dentalia were included in the same order, as by some previous authors. The same group was adopted by Moërch under the name of *Heteroglossata* and divided into the *Cyclobranchiata* i. e. *Patella*, *Chiton;* and the *Cirribranchiata* viz., *Dentalium*.

In the present state of our knowledge in regard to the embryology and anatomy of *Dentalium* and *Chiton*, these views can no longer be maintained, and the two groups indicated by these names in their widest sense, will take rank henceforth as distinct orders.

The order *Docoglossa*, as here restricted, was first recognized by me in a "Revision of the Classification of the Mollusca of Massachusetts," (Proc. Bost. Soc. Nat. Hist, xiii, p. 245, March, 1870), at which time only the characters of the sub-order *Abranchiata* had been fully worked out. Since that time I have investigated the characters of the sub-order *Proteobranchiata* as here restricted, and, in a paper read before the Am. Assoc. Adv. Sci.,

at the Troy meeting, Sept., 1870, (of which a synopsis was published in the Am. Naturalist, Nov., 1870, p. 561), I restricted the whole order within its present limits from the researches above mentioned. Among the fruits of these investigations was the definite exclusion of the *Gadiniidæ* from the order, (see Am. Jour. Conch. vi. p. 8, 1870). It is proper to state that, on general considerations, Prof. Theodore Gill, in his unpublished manuscripts, had adopted similar limits for the order, though the conclusions to which I have been led were the results of entirely independent investigations.

A brief synopsis of the order and its subdivisions as here adopted, was, for the sake of insuring priority, presented to the Boston Society of Natural History in September, 1870, and published *in advance* of the Proceedings, February 7th, 1871.

### *Formulating the Dentition.*

Attempts have frequently been made, with greater or less success, to devise a method of formulating, mathematically, the different styles of dentition. Having used several methods, and finding them all more or less deficient in some particulars, I would propose the following as an improvement upon any now in use, and likely to meet any demands that can reasonably be made upon it. For greater compactness the formula may be written in the form of a fraction, with the rhachidian tooth as a numerator; the lateral teeth enclosed in brackets and the uncini outside of the brackets, as a denominator. The median line in the latter may be indicated by a period and the teeth of the lateral and uncinal series severally connected by a *plus* sign. Each separate tooth may be denoted by a fraction, the denominator representing the number of cusps, and if there is more than one tooth similarly formed, the numerator of the fraction will serve to indicate the number, For instance, suppose we have a radula with a median tooth possessing five cusps, this tooth would be indicated by a fraction thus $\frac{1}{5}$. If there were six inner laterals each with three cusps they would be formulated by the fraction, $\frac{6}{3}$; another lateral tooth outside of them with one cusp or entirely simple would be written $\frac{1}{1}$, and connected with the other six with a *plus* sign. Ten simple uncini on each side would form a fraction $\frac{10}{1}$, and the whole formula would be $\frac{\frac{1}{5}}{\frac{10}{1}(\frac{1}{1}+\frac{6}{3}.\frac{6}{3}+\frac{1}{1})\frac{10}{1}}$. The absence of teeth in either series might be indicated by a cipher, thus $\frac{0}{\frac{10}{1}(\frac{1}{1}+\frac{6}{3}.\frac{6}{3}+\frac{1}{1})\frac{10}{1}}$ or $\frac{\frac{1}{5}}{0.0.}$

This supposes that all the teeth are in one transverse line, but when, as in many patellæ, some of the laterals are in a series in advance of the rest, a *minus* sign would serve to indicate their relative position in substitution for the *plus* sign; as, $\frac{0}{3(\frac{1}{3}-\frac{2}{1}.\frac{2}{1}-\frac{1}{3})3}$ would signify a radula without a median tooth, in which the two simple inner lateral teeth on each side are in advance of the three cusped third lateral, and which was provided with three uncini. The advantage of the system is evident, from the small space in which a large amount of information can be compressed and yet remain perfectly comprehensible. It is true that it is slightly more complicated than that in use at present, but hardly so to an objectionable extent. When the cusps are quite simple the fractional form of the formula for each tooth may be dispensed with. The method thus indicated will be used throughout this paper.

*General Remarks.*

The dentition of the *Docoglossa vera*, has certain well marked characteristics not common to other groups. The radula is usually jointed, or rather divided by impressed transverse lines between each series of teeth and its neighbors. This flat section I shall term, for convenience, the *area*. The area is bounded on each side by a narrow smooth pleura, upon which the uncini are situated, if any exist. Upon the area are certain solid, more or less thickened, plates or bosses, of intricate form; generally, but not always, bearing teeth. These bosses are sometimes translucent, but are usually more deeply colored than the area, upon which they are solidly fixed. Upon the bosses are found strong, recurved, hooked teeth, almost invariably black and opaque. The teeth are readily detached from the bosses; in fact, with specimens long preserved in alcohol, it is difficult to obtain any part of the ribbon with the cusps undisturbed, while the bosses cannot be detached from the area by any means short of the destruction of both. The radulæ of this group are apparently less purely chitinous than those of the *Pulmonata*, *Rhachiglossa*, &c., as they cannot be boiled in potash for an instant without detaching all the cusps from the bosses, and in a very short time the greater portion of the radula itself will be destroyed. Even soaking in a weak potash solution, quite cold, in order to cleanse the structure, must not be long protracted, or the latter will become disorganized. All the species are furnished with a more or less cartilaginous jaw, which is also destructible in potash.

The *Docoglossa*, as a group, manifest what may be termed a

peculiar persistency of immaturity, when compared with other groups of Gasteropods. The embryonic shell is dish-shaped, according to Carpenter and Fischer, and this form is persistent in the adult. The dentition is characterized by a want of solidification of the chitine, especially in the *Patellidæ*, and the teeth of some forms are represented by mere undeveloped bosses in others, and even these are absent in a third series. In no group are the fundamental outlines of the bases of the teeth so difficult to make out or represent by figures. Their variation, within certain limits, is noticeable, and a tendency to melt one into another, so to speak, may frequently be observed. The teeth can be clearly separated into three series, median or rhachidian, lateral and uncinal. The lateral teeth are distinguished from the uncini by being situated upon the *area*, while the uncini are invariably upon the *pleuræ*.

The order is obviously separable by the dentition into two groups, viz., those with lateral teeth and those without them. The first is almost invariably destitute of a rhachidian tooth; in one form (*Acmæa* as restricted) we find no uncini or median teeth; in another (*Ancistromesus*, n. g.) we find all of the series represented; but, throughout the group the lateral teeth are persistent and three in number. The second group is furnished with a large and prominent rhachidian tooth and several uncini.

These differences are coördinated by others in the soft parts. Those possessing lateral teeth are also furnished with eyes and branchiæ. Those without laterals are also destitute of the above mentioned organs.

The latter comprise the family *Lepetidæ*, and will take the subordinal name of *Abranchiata*.

As the examinations detailed in this paper show that the suborders *Cyclo-* and *Cervico-branchiata* are not separable from each other by any characters whatever, being combined in some instances in a single individual; and as the terms above mentioned convey an error, *inter se*, and have also been applied to other groups, I shall propose for the group formed by their consolidation the subordinal name of *Proteo-branchiata*.

The *Proteo-branchiata* are divisible into two groups, by anatomical characters as well as the dentition; though the shells afford no high diagnostic characters. These comprise, 1st, those possessing a distinct cervical branchia and without a median tooth, and not more than two uncini. 2d, those without a cervical branchia, with or without a median tooth, and with three uncini on each side.

The first group will form the restricted family *Acmæidæ*, and the second the *Patellidæ*. Both groups are furnished with three

lateral teeth variously disposed upon the area, on each side of the median line.

The following synopsis will indicate the various groups and their characters with special reference to the species of the north-west coast of America. With regard to the species mentioned their synonymy, when not given, will be found at length in the excellent papers of Dr. Carpenter, and the other works alluded to in the foot notes. The generic synonymy, which was not given in full by Dr. Carpenter, is here worked out, as far as the materials at hand will allow. The absence of a number of species of which the soft parts are unattainable at present, will be noted by the student. These gaps are to be regretted, but will doubtless be made good in time. Meanwhile, sufficient information has been obtained to render our knowledge of a number of groups moderately complete, and while it is possible that the examination of the soft parts of the many species yet unknown except by the shell, may add several groups to those already eliminated, still it is probable that a very large proportion will fall naturally into the genera here indicated.

The materials upon which the following approximation to an arrangement of the limpets is based are as follows: For the species of the north-west coast of America, upon my own rather considerable collections in that quarter, and those of the Scientific Corps of the W. U. Telegraph Expedition, under my charge; comprising many thousand specimens, both in a dry and an alcoholic condition, and obtained in a range extending from San Juan del Sud, on the west coast of Nicaragua to Bering Strait; the large collections of the Smithsonian Institution, named by Dr. P. P. Carpenter, whose knowledge and careful consideration of the subject is excelled by none; and specimens collected by Messrs. Stearns, Cooper, Rowell, Swan and others in the same collection. For the *Patellidæ* and most of the species not from the north-west coast I am indebted to Dr. Wm. Stimpson, the Boston Society of Natural History, the Museum of Comparative Zoology at Cambridge, Mass., and to the collections of the Wilkes Exploring Expedition in the Smithsonian Cabinet, for examples. In this group my alcoholic materials have been more limited than among the *Acmæidæ*, yet they have been sufficient to establish the existence of several well marked groups not hitherto restricted. The notes on the colors and external appearance of the animals when not taken from my own notes, those of Mr. Couthouy, or some other author mentioned, are from the alcoholic specimens and, in some instances, perhaps may describe the general appearance of a few individual specimens rather than that of a whole race; any errors due to this

cause may, however, be corrected in time and with larger material. Great care has been taken, repetition has been made frequently in the description of minute characters common to several species in preference to leaving an opportunity for doubt as to the characters in each, by silence or cross references.

A certain geographical agreement in regard to generic characters has been observed, which, as far as it offers any grounds for speculation, rather favors the hypothesis of a development of the various forms from a few more simple and more closely allied ancestors. Thus, most of the species from the Straits of Magellan are provided with lateral frills on the foot, and also agree in having the laterals 2—1·1—2 (*Patinella*, *Nacella*); those of the British Seas on the other hand have the foot smooth and the teeth 1—2 · 2—1 (*Patella*, *Patina*); the Amboynese species of *Acmæidæ* agree in possessing two minute uncini instead of one, as in the west coast forms; the subgenus *Collisella* attains an extraordinary development upon the West American coast, and nowhere else, comparatively few species being known from other seas. On the other hand, certain sporadic forms, like the species of *Acmæa* occur in widely separated districts. These results, unquestionably due to some law, of which we have as yet only the vaguest intimations, I cannot attribute to the very plausible but highly unsatisfactory doctrine of "natural selection." No doubt the latter has had much to do in the vast field of nature, especially among plants, insects and birds, but there is no reason, except our own natural desire for a theory of some kind, for believing that it has had any appreciable effect on the development of the mollusca. I am impressed with the belief that there will ultimately be found to exist some law or laws far more profound and incisive, and as general and deep-seated as that elucidated by Mr. Darwin, governing without essential exception, the phenomena of evolution all over the globe.

Anatomical investigations from alcoholic specimens alone are very liable to error, from the rigidity of the parts, and this is especially true in regard to the finer details of the nervous and circulatory system. I have therefore attempted only a general outline of the anatomy of any of the species. The most noticeable differences between the two families Acmæidæ and Patellidæ are, that in the former a cervical branchia is present, the muzzle is provided with a frill,* there appears (in some species, at least) to be but a single renal organ, the crop is inconspicuous and the radula lies in a long double loop on the upper pos-

* Produced, in the subgenus *Acmæa* alone, into a lappet or tubercle at each side of the muzzle.

terior surface of the liver; in the latter there is no cervical branchia, the muzzle has no frili, there are two renal organs (according to Mr. Lankester), the crop is frequently large and prominent, and the radula is coiled on the anterior under surface of the liver. The branchiæ are subject in this suborder to the most extraordinary variations.

It will be noticed that the accompanying figures of *Collisella testudinalis* and *Patella vulgata* differ from those of Gray and Lovèn. The reason of this is that in the first case the long cusps of Gray's figure are due to the fact that they are broken down upon the cusps of the other laterals, instead of being represented in their natural position. In the case of *Patella vulgata*, strange as it may appear, though it has been often figured, I have not been able to find a single figure which expresses *all* the characters distinctly. Wilton's, in Woodward's Manual, is in some respects the best, but the tridentate cusp of the third lateral is so rendered that it appears as if it belonged to two teeth, and the uncini are poorly shown. Lovèn's figure is worse, but his figure of the teeth of *Acmæa virginea* is very good, and bears comparison with the object itself.

Care should be taken in figuring the dentition of any of the *Docoglossa* not to break down or crush the long slender cusps, or to confound the *bosses* which ornament the *area* with true cusped teeth. Bosses often occur, even on the pleura, without any tooth or cusp at all, and this should be carefully noted, but not incorporated into the formula. The central line is frequently indicated by an elongated narrow boss between the inner laterals, which is however barely perceptible and never carries a cusp. It is undoubtably the homologue of the rhachidian tooth, which only appears in this family in the single genus *Ancistromesus*. A sharp lookout should be kept for the minute uncini figured in *Collisella*, which are as readily overlooked.

The reader will notice a wholesale consolidation of generic names founded on trivial, inconstant and imaginary characters; yet, whenever practicable, the old and familiar names have been retained. In many cases, however, they have become so involved in a tissue of errors and confusion that it has been no easy matter to extricate the types and decide on their several claims. For the old and new generic names adopted in this paper, tangible, and it is to be hoped sufficient, characters have been given, in most cases, for the first time.

I have regarded as at least of subgeneric value decided differences in the branchiæ, in the dental formula, and, when accompanied by other characters, such a difference in the shell as for instance exists between *Patella vulgata* and *Patina pellucida;*

the difference of the shell alone, however, is of minor importance, and without other characters affords no safe ground for classification, and is utterly unreliable in determining affinities.

In one case only am I in doubt as to the status of a name which I have here provisionally adopted. I refer to the subgenus *Helcioniscus*, which may require eventually to be merged in the genus *Helcion*. The dentition differs essentially from that of *Patina*, and the shells of both are widely removed from that of the typical *Helcion pectinatus*, of the Mediterranean, the only species of that genus as far as known; yet one or the other may prove eventually congeneric.

Unfortunately the dentition of the type of *Helcion* is unknown. When it shall be worked out the question can be satisfactorily settled. Meanwhile, rather than lose sight of the characters which are known, in *Patina* and *Helcionella*, I prefer to retain the three subgroups until we can unite or definitely separate them by actual knowledge of their relations.

I find, by wide comparison of specimens, that the forms indicated by the names *Cymbula*, *Scutellastra*, and even *Olana*, are due to habitat rather than specific characters, and merge imperceptibly one into another, in different and even in the same species; hence I feel justified in referring them to *Patella* as synonyms. *Scutellina*, again, doubtless contains species which should be referred to several groups already described, and very possibly some which may stand as distinct; yet the animal of the only species which has been described does not seem to differ at all from *Acmæa*, as far as we know its characters, and hence I prefer to omit the name in the series; giving it, with its own exclusive synonyms under it, as a probable synonym of *Acmæa*, Esch., in part, and for the remainder suspending judgment until we obtain more information.

With regard to the synonymy, no opportunity has been omitted of consulting the original descriptions, rather than the unreliable and often erroneous references of authors who have not taken the trouble of verifying their opinions. It is believed to be essentially accurate, and only liable to change from a more thorough examination of the characters of the type of *Helcion*.

Trusting that the result of my labor may be to throw some light upon an interesting and very complex subject, I would ask the coöperation of other students in extending these researches still further, and in correcting any of the almost inevitable errors which may be found in this as well as almost all similar work.

## Class **GASTEROPODA.**

### Order DOCOGLOSSA, Dall ex Troschel.

#### Suborder *ABRANCHIATA* (Gill) Dall.

Animal destitute of eyes or branchiæ, furnished with a rhachidian tooth and uncini, but without lateral teeth upon the radula.

#### Family LEPETIDÆ.*

Shell with apex anteriorly directed, patelliform; muzzle prolonged below in two tentacular appendages; teeth, $_2(\overline{0}\cdot\frac{1}{0})_2$.

##### Genus LEPETA, Dall ex Gray.

##### Subgenus LEPETA, Dall.

Rhachidian tooth tricuspid, concave in front. Central cusp much the largest, simple; lateral cusps small, emarginate. Base very broad. Uncini with simple cusps.

##### Subgenus CRYPTOBRANCHIA, Dall ex Midd.

Rhachidian tooth with three short cusps, equal and parallel before and behind, not pointed. Base more or less ornate behind, moderately broad. Uncini with simple cusps.

##### Subgenus PILIDIUM,† Forbes.

Rhachidian tooth tricuspid, convex before, central cusp much the largest, lateral cusps simply pointed; base very narrow. Uncini with cusps obliquely twisted.

#### Suborder *PROTEOBRANCHIATA*, Dall.

Animal branchiferous, oculiferous. Rhachidian tooth rarely present. Lateral teeth invariably present; three in number.

* For synonymy, &c., see "Materials for a Monograph of the Family Lepetidæ," by W. H. Dall, Am. Journ. Conch. v, pp. 140—150.

† Although Forbes and Hanley were acquainted with the *Lepeta cæca* of Müller, it would appear that they erected the *Patella fulva* into a distinct genus upon the erroneous supposition that the apex of *Lepeta* was directed posteriorly. The genus *Lepeta* is Atlantic, and *Cryptobranchia* is *Pacific*, in its distribution. I have seen no true *Lepeta cæca* from the Pacific, though it has been frequently reported from Japan and elsewhere. All the Pacific specimens sent by Dr. Carpenter under that name, and those in the Smithsonian collection dredged by Mr. A. Adams in Japan, and so denominated, upon inspection and actual comparison are undoubtedly different, and probably conspecific with *Cryptobranchia concentrica*, Midd.

Family ACMÆIDÆ, Cpr.

≺ *Phyllidiana*. Lam., Phil. Zool. 1809. Gld., Inv. Mass. Ed. 1, p. 146, 1841.

≺ *Patellada*, Guilding, Zool. Journal, iii, p. 535, 1828.

≺ *Patellaceæ*, Mke., Syn. Ed. 1828, *olim*. Hinds, Voy. Sulph. Zool. p. 53.

≺ *Patellacea*. Mke., Syn. Ed. 1830, p. 90. Forbes, Mal. Mon. p. 35, 1838.

≺ *Patellæ*, Fér., Tab. Syst. p. xxxvii, 1821. Rang, Man. p. 251, 1829. Desh., Enc. Méth. iii, 1830.

≺ *Patellidæ*, D'Orb., Moll. Can. 1837. Binn., Inv. Mass. Ed. ii, p. 267, 1870. Woodw., Man. p. 153. Cpr., Rep. Br. Assoc. 1856, p. 318. Jeffreys, Brit. Conch. iii, p. 229 (in *Pectinibranchiata*).

≺ *Fissurellidæ*, D'Orb., Voy. Am. Mér. v, p. 470, 1840. Rve., Conch. Syst. ii, p. 17. C. B. Ad., Pan. Sh. p. 241.

≺≺ *Fissurellina*, Macgill, Moll. Aberdeen, p. 65, 1843.

≺≺ *Patellina*, Wiegm., Handb. der Zool. p. 546, 1832. Milne-Edw. Conch. Textb. Ed. vi, p. 197.

≺ *Patelloidea*. Risso, Hist. iv, p. 260, 1826 (not of Férussac, Rang and Menke).

-- *Lottiadæ*, Gray, Syn. Brit. Mus. 1840. Rev. Zool. p. 355, 1844 (in *Tectibranchiata*).

= *Lottidæ*, D'Orb., Moll. Cub. i, p. 93, 1841 (in *Scutibranchiata*.)

= *Tecturidæ*, Gray, P. Z. S. 1847, p. 158. Mrs. Gray's Moll. iv, p. 92, 158, 1850. H. and A. Adams, Genera Rec. Moll. i, p. 458. Dall., Rev. of the Classification of the Mass. Moll. Proc. B. S. Nat. Hist. 1870, p. 245.

≺≺ *Tecturidæ*, Gray, Guide Moll. 1857, p. 169.

≺≺ *Scutelliidæ*, Chenu, Man. de Conchyl. i, p. 374.

= *Acmæidæ*, Cpr., Maz. Shells, p. 202, 1856. Sup. Rep. Br. Assoc. 1863, p. 650. Am. Journ. Conch. ii, p. 332. Lect. on Moll. p. 71 (in *Scutibranchiata*).

Shell patelliform, subsymmetrical; animal with a free branchial plume above the left side of the neck. Radula with, or without uncini on each side, no median tooth, and often destitute of uncini; disk of the muzzle surrounded by a narrow frill of integument.

Genus ACMÆA, Esch., 1828.

*Acmæa*, Eschscholtz in App. Kotzebue's New Voyage round the World, &c. Dorpat, 1828. Colburn & Bentley's London translation, 1830, p. 350; vol. ii (no type or species named). Eschscholtz, Zool. Atlas, pt. 5, Ed. Rathke,

1833, p. 16, pl. xxiii and xxiv. (Type *Acmæa mitra*, Esch.) Forbes and Hanley, Brit. Moll. ii, p. 433. ( Woodward, Man. p. 155.) Philippi, Handb. p. 199. Carpenter, Mazatlan Catalogue, p. 202. Lect. p. 71, Ed. ii. Sup. Rep. 1863, p. 650. Am. Journ. Conch. vol. ii, p. 332.

*Tectura*, Aud. and Milne-Edw. in Rep. of Cuvier on their three Memoirs. An. Sci. Nat. vol. xxi, p. 326, Nov. 1830. (Type *Patella parva?*)

*Patelloida*, Quoy and Gaim., Voy. Astrolabe, iii, 1833. (Type *P. rugosa*, Quoy *fide* Gray.) Encyc. Meth. iii, p. 704, 1832.

*Patella***, Loven, Ofv. af. K. Vetensk. Ak. För. June, 1847, p. 198. (*P. testudinalis*, L.)

*Patelloidea*, Cantraine, Diagnoses or descr. of some new sp. of Moll. Bull., Ac. Sci. Bruxelles, 1835. Also, Guerin, Bull. Zool. 1835, Livr. 7 & 8, Sect. 2, p. 129.

*Lottia*, Gray, Phil. Trans. 123, 1833, p. 800, note. (No type or species mentioned.) Ib. 125, 1835, p. 302. P. Z. S. 1847, p. 158.

*Lottia*, Gray, Syn. Moll. Br. Mus. 1840. Revue Zool. p. 355, 1844. Forbes, Mal. Monensis, p. 34, 1838. Moll. Ægean Sea, p. 135, 1844. Reeve, Proc. Zool. Soc. p. 75, 1841. Reeve and Catlow, Conch. Nom. p. 99, 1845. Möller, Index Moll. Grœnl. p. 16, 1842. Alder, Ann. and Mag. Nat. Hist. viii, p. 405, 1842. Macgillivray, Moll. Aberdeen, p. 65, 1843. Morris, Brit. Foss. p. 149, 1843. Gld., Otia Conch, pp. 9, 242. Moll. U. S. Exploring Exp. p. 349.

*Patelloidea*, Couthouy, Bost. Journ. N. H. ii, p. 171, 1839. (*P. amoena*, Say, = *testudinalis*) D'Orb., *olim*. Voy. Am. Mer. v. Chenu, Man. de Conchyl. i, p. 374.

*Iothia*, Forbes (err. typog.), Lond. Athen. Oct. 6, 1849, p. 1018) not = *Iothia*, Gray, Adams, Catlow).

*Tectura*, Gray, P. Z. S. 1847, p. 158, No. 275. Guide to Moll. p. 169. Mrs. Gray's Moll. iv, p. 92. H. and A. Ad., Gen. Rec. Moll. i, p. 458. Meek, Check List Cret. Inv. 1864, p. 17. Dall, Rev. Class. Mass. Moll. Proc. B. S. N. H. 1870, p. 245.

< *Tectura*, Jeffreys, Brit. Conch. iii, p. 245. Mörch, Cat. Yoldi, p. 143, 1852.

*Helicon*, Keferstein, Bronn. Klass. u. Ord. des Thier. iii, Mal. ceph. in reference to pl. 75, f. 6.

*Scurria*, sp. Gray, Adams, Cpr., op. cit.

*Pileopsis*, sp. Eichwald.

*Helcion*, sp. D'Orbigny, Voy. Am. Mér. v, p. 478; not Montfort.

*Ancylus*, sp. Costa.

Also, (to a greater or less extent, as yet undetermined):

*Scutellina*, Gray, P. Z. S. 1847, p. 168. (Type *S. crenulata*, Brod. sp.) Gld. Otia Conch. p. 242. Woodw., Man. Rec. and Foss. Shells, p. 155. Cpr., Lect. Moll. p. 71.

*Scutella*, Brod. (not Lam.), P. Z. S. 1834, p. 47. Müll., Syn. Test. Viv. p. 161, 1836. (*S. crenulata*, Brod.) Sby., Conch. Man. Ed. ii, pp. 225, 254.

*Scutellina*, H. and A. Ad., Gen. Rec. Moll. i, p. 460. Chenu, Man. de Conchyl. i, p. 375 (part).

*Crepidula*, sp. C. B. Ad., Pan. Shells, p. 234, No. 352.

The Latin designation of Eschscholtz (accompanied by a definite description) has two years' precedence of the trivial French name of Audouin and Milne Edwards, as mentioned by Cuvier. The *Récherches pour servir a l'histoire naturelle du Littoral de la France*, was published in 1832. It consisted of two volumes, the first being a general introduction, with some account of the fisheries, and the second is devoted to the Annelides. On page 144 of the first volume the authors state that they propose to create a new genus for some little rosy Patellas found on the coast of La Manche, on account of the peculiar cervical branchia, and that this genus is constituted in a resumé of their investigations offered to the Academy in November, 1829. No name of genus or type is mentioned.

Turning to the *Annales des Sciences Naturelles* (vol. xxi, p. 326) for November, 1830 (not 1829, as stated above), we find a report by Cuvier on three memoirs by the naturalists alluded to, in which he mentions "*leur genre Tecture*," but without giving any Latin name to it, and referring with doubt to *Patella parva* (= *virginea* Müll.) as the type.

Gray, in 1847 (P. Z. S.), appears to have been the first to give the name *Tecture* a Latin form; at least a very careful search has failed to reveal its publication anywhere previously.

Under the circumstances it seems extraordinary that the name should have been adopted by naturalists, and especially that we should find such allusions to it as those of Mr. Jeffreys in the British Conchology, vol. iii, p. 244–5. No one, we think, will hold that a Latin name should give place to a vernacular designation, even if the latter has priority, which it has not in the present case.

The animal of the typical species of *Scutellina* has not been examined, but that of a closely allied species, *S. ferruginea*,

from the drawing of Mr. *A. Adams* in the Gen. Rec. Moll., appears to agree in all essential particulars with *Acmæa*. Still it is not improbable that some of the species may prove to differ sufficiently from the Acmæas to retain a separate generic name. The anterior margin of some of them is almost straight, and one of these was described as a *Crepidula* by Prof. C. B. Adams.

The statement made by Forbes, and copied by Gray, Jeffreys and other authors, that the free branchial plume of *Acmæa* is equivalent to the circle of leaflets around the mantle of *Patella*, is manifestly erroneous. No one can examine the latter without perceiving that the two organs are not homologous; the lappets of *Patella* rise in a different place from the cervical branchia of *Acmæa*, they are supplied by different veins and nerves, and in those forms where the circle is interrupted before the head the ends of the cordon are far removed from the point of insertion of the cervical branchia. Nothing more is needed to show the erroneous nature of such a comparison after the discovery of species in which both the cordon and the cervical plume are found, as in *Scurria mesoleuca*. On the other hand, it is equally true that the cordon of *Patella* is not to be homologized with the respiratory organs of the Chitons. An examination of any species of *Chiton* will show that the branchiæ are, each in itself, of a radically different construction from those of *Patella*, each representing a plume furnished with transverse laminæ, analogous to the single plume of *Acmæa*. This conclusion is irresistible upon a careful examination of the branchiæ by any one possessed of a slight knowledge of comparative anatomy, and is fully confirmed by Dr. Williams in his admirable paper on the mechanism of aquatic respiration in invertebrate animals. (Ann. Nat. Hist. 1855, p. 413.) The branchial system of the Fissurellidæ, according to that author, differs widely from that of the *Docoglossa*, and the dentition and other anatomical details confirm his conclusions from the study of the branchiæ. The gills of *Emarginula* and *Propilidium* offer closer analogies with the Acmæidæ, but other characters show that their strongest affinities lie with the true Scutibranchs, though the dentition of *Propilidium* remains to be examined.

Blainville supposed that the function of respiration in *Patella* was carried on especially by a net work of vessels in the thin and delicate area of the mantle over the head, which I have termed the "hood." It is by no means improbable that this is the case in the *Abranchiata*, and to some extent the branchia in the *Patellidæ* may also be assisted by the mantle, though this is not yet proven. I have noticed in many species a most beautiful net work of vessels in this locality, which cannot be without an office of some kind.

The preceding synonymy refers to the genus *Acmæa*, Eschscholtz, as a whole, the following to the subgenus as now restricted.

Subgenus ACMÆA, (*sensu stricto*) Esch. Philippi., 1846.

*Gen. char.* Animal unprovided with a branchial cordon of lamellæ or any similar appendages between the mantle and the foot. Radula provided with three, subequal, similar, simple lateral teeth on each side, arranged in a line which forms an angle with the rhachis, each tooth being laterally and transversely parallel with the corresponding tooth in the opposite side, and the longitudinal axes of all the cusps being nearly or quite parallel with the median line of the radula which is destitute of uncini. Muzzle frill produced at the lower anterior corners into two lappets or tubercles. Shell solid, with an erect or anteriorly inclined apex.

Type ACMÆA MITRA, Esch. Plate, 14, fig. 1.

Syn. *Acmæa mitra*, (Esch.) Rathke. Zool. Atlas, part v. p. 18, No. 1, pl, xxiii, fig. 4.
*Acmæa mammillata*, Esch., ib., p. 18, No. 2.
*Acmæa marmorea* Esch., ib., p. 19, No. 3.
*Scurria mitra*, Gray, Adams, Cpr., &c., (pars.)
*Lottia conica*, Gld., Moll. U. S. Expl. Exp. p. 346, (maxima pars.)
*Scurria? mitra*, Dall, Am. J. Conch. v. p. 149, pl. xv, 1869.
Not *Scurria mitra*, Alcock (MSS.) Am. J. Conch. ii, p. 345 =*Scurria scurra* Less., nor
*Scurria scurra*, Lesson as aver Gray, Adams, D'Orbigny, and others.

Soft parts of a waxen white. Foot short, subcircular, smooth below and on the sides. Thickened portion of the mantle edge narrow, perfectly smooth all round, thinner portion ditto. Head short, stout; muzzle broad, transversely oval, furnished with a narrow, granulose frill which extends entirely around it, and at the lower corner on each side is produced into a sort of tubercle. Between these tubercles, below, the frill is very narrow. Disk of the muzzle granulose, radiately grooved. Mouth horseshoe shaped. Tentacles in the adult moderately long, cylindrical, very little swollen at the base, which is constricted without any tubercle on the inner side as in most of the *Patellæ*; tips bluntly rounded. The very young have the tentacles more swollen and pointed, proportionately. Eyes small, black, on the upper posterior bases of the tentacles. Gill stout, attached to the mantle a little to the left above the head; pointing forward a little to

the right; on the left side is a border formed by an impressed line which extends from the base to the apex of the organ; a large vessel sends forth branches to the lamellæ from this side. The laminæ are very prominent, so that the gill appears very thick and stout. Close to the adductor on the extreme right are (1) the anal tubercle, small, conical, pointing to the right, and (2) the infra anal * papilla, smaller than the other and to the right of it. The renal orifice is probably very minute and situated to the left of the anal tubercle, but a thorough search failed to detect it. Intestine regularly and repeatedly constricted toward its termination, expelling the fæces in cylindrical pellets. In all the specimens examined it was full of white calcareous remains of nullipore.

Shell dull white, aperture nearly circular, wider behind, in some young examples somewhat elongated oval; form conical, apex erect, nearly central, blunt, smooth; posterior surface usually straight but occasionally a little convex, exterior smooth, marked with very faint concentric lines of growth; devoid of epidermis; margin entire, polished, with a narrow semi-pellucid rim inside. Internally smooth or furnished with grooves radiating from the apex more or less strongly marked. Muscular impressions deep, strong, horseshoe-shaped, with the marks of the anterior ends of the adductors rounded and broader than the rest, connected by a slender impressed line marking the attachment of the mantle. Young shells are often furnished with irregular riblets more or less strong, many or few in number, radiating from the apex but stronger towards the margin. Color, dead white inside and out, often livid, or tinged a fine pink or pea green from nullipore, but never wax yellow or horny pellucid as in the normal state of *Scurria scurra*. Formula

$$0(\overline{1}\text{—}1\text{—}\overline{1.1}\text{—}1\text{—}\overline{1})0.$$

I have been thus explicit because, by almost every author except Dr. Carpenter, this shell has been confounded with the South American species above mentioned; which, however, belongs to a different genus. Taken together, the most conservative conchologist would hardly think of uniting them; short descriptions and poor figures are mostly to blame for the confusion. The striated variety (*tenuisculpta*, Cpr.,) appears very distinct from the smooth form, but every gradation may be found in a very large series. The unique type of *Scurria? funiculata*, Cpr., now before me, differs from the smallest specimen of *tenuisculpta*, only in having the riblets even more prominent, close, and rounded, and being

* Infra-anal orifice of Lankester; see remarks under *Patella vulgata*.

thinner and smaller. It appears to me to be only a very marked, and probably individual, variation. It may, however, eventually prove conspecific with "*Patella*" *Lamanonii*, Schrenck, (Amurl. moll.) which is with little doubt the same as "*Patella*" *pallida*, Gld. (Proc. Bost. Soc. Nat. Hist. 1859.)

This species lives below low water mark, on stones; it ranges from the Aleutian Islands to San Diego, California. It is very abundant where Eschscholtz procured it, at Sitka, and equally so at Monterey. It is generally overgrown with nullipore which covers it with a regular series of nodules, and tinges the shell green or pink. Frequently a tuft of calcareous algæ waves from the apex, and the unconscious limpet literally bears a "feather in his cap." It feeds principally upon nullipore, and the encrusted variety seems to have constituted Eschscholtz' second species of *Acmæa* (*A. mammillata.*)

His first species is the one under consideration, and even if congeneric the name *Scurria* would have to make way for that of *Acmæa*, as the latter has eighteen years priority, and this species is the type *, including as it does the first three nominal species of Eschscholtz. Gray (1847) appears to have taken *A. scutum* (=*patina*) as the type, because on the plate the figure of *scutum* is numbered "1"; but it is really the sixth species of the list. The peculiar form and arrangement of the teeth, and the mouth-tubercles separate it from the rest of the Acmæids except, curiously enough, the type of the quondam genus *Tectura*, which is thus rendered an exact synonym of *Acmæa*. A pretty full account of the anatomy is given by Rathke, who published the last portion of Eschscholtz' Atlas, after the death of the latter naturalist.

ACMÆA VIRGINEA, Müll. sp. Plate 14, fig. 2.

*Patella virginea*, Müll., Prod. p. 237, Zool. Dan. pl. 12, f. 4, 5.
*Patella parva*, Da Costa, Brit. Conch. p. 7, pl. 8, f. 11.
*Patella pulchella*, Fbs., Mag. Nat. Hist. viii, p. 591, f. 61.
*Lottia pulchella*, Brown Ill. Conch. Gt. Brit. ii, p. 480.
*Tectura virginea*, S. Wood, Crag. Moll. i, p. 161.
*Acmæa virginea*, Hanley, Brit. Marine Conch. p. xxxii. Fbs. and Hanl. Br. Moll. ii. p. 437.
*Tectura virginea*, Jeffr., Brit. Conch. iii, p. 248.

Soft parts mostly whitish, faintly suffused with pink; mantle edge thickened, fringed with unequal filaments a little within the

*This is the only species mentioned by Rathke in the generic diagnosis, and it was also adopted by Philippi as the type, in his review of the west coast limpets, in 1846.

margin. Foot oval, thin, sides smooth; head rosy, short, broad and semicircular; muzzle very short, frill produced into two lappets, as in the last species. Tentacles rather long, slender, pointed. Gill very long, drab, extensile and contractile, narrow and situated on the left side of the head, base a little forward of the junction of the neck and hood and springing from the under surface of the mantle, pointing from left to right across the neck and composed of a thin membrane bearing a series of lamellæ above, and another somewhat larger series below, as in most Acmæids. Anal and infra-anal papillæ as in the last, renal not detected. Formula $\frac{0}{0(1—1—1.1—1—1)0}$.

The specimens from which the above notes were taken were dredged by Dr. Stimpson near Oban, Scotland. It ranges from Iceland to the Azores (Jeffreys.) It has not the slightest resemblance whatever to *Acmæa asmi* of Middendorf, as suggested by Jeffreys (l. c.)

The shell has been well described by Forbes and Hanley, and Jeffreys, *op. cit.*

The statement of Clark in regard to the nidification of the ova, is too widely different from the habits of the other species to be taken without further confirmation; it is probably a misapprehension caused by the entanglement of some loose ova in the mucus of the foot.

ACMÆA INSESSA, Hinds. Pl. 14, fig. 3.

*Patella insessa*, Hds., An. Nat. Hist. x, p. 82, pl. vi, f. 3.
*Nacella incessa*, Cpr., Sup. Rep. Br. As. 1863, p. 650.

Soft parts slaty green, upper edge of mantle dark brown. Mantle and sides of foot smooth; tentacles cylindrical, stout, moderately long; eyes black, small on the upper posterior tentacle-bases, foot smooth, subovate; gill small, broad, triangular; muzzle frilled, disk granulose or nearly smooth, frill produced at each outer lower corner into two bluntly rounded lappets. Radula narrow, cusps reddish brown, rather more slender than in the last species. Formula $\frac{0}{0(1—1—1.1—1—1)0}$. The specimen which affords the above notes was obtained from a Laminaria frond at Monterey. Range from Sitka (rare) to Monterey (common) and San Diego (scarce.)

In the young and perfect condition this shell has some very peculiar brilliant white marks on the apex which appear to consist, in a shell ·2 of an inch long, of a band in front of the apex, one just behind it, and a V-shaped mark still more posterior. These are, however, confined to the first and thinnest layer of the

shell and are soon worn, so as to present the appearance of six white dots radiating from the apex, and in all adult shells they are wanting. This strongly reminds one of *Scurria*, which has a white tip, sometimes marked with brown in a similar manner. The peculiar waxen, or semi-translucent, brown outer layer, also resembles the type of *Scurria*, which is also furnished with similar, radiating, fine striæ. I have a thin, long, compressed specimen exactly intermediate between the typical form and *A. paleacea*.

ACMÆA (?) INSTABILIS, Gld.

*Patella instabilis*, Gld., Proc. B. S. N. Hist. ii, 150, 1846, Exp. Shells 9.

*Nacella instabilis*, Cpr., Sup. Rep. Br. As. 1863, p. 650.

I have seen a large series of this species, but none with a perfect apex. It much resembles the last species, but appears to be specifically distinct. The principal difference is in the sculpture, which is in rather distant grooves instead of striæ, and in the size of the adult, which is much larger than the last species. The differences of form are probably due to a peculiar habitat. The place of this species would seem, from the close resemblance of the shell, to be probably in this division of the genus, but all classification (other than provisional) from the shells alone is time and work wasted. Neither this species nor the last, as far as we know, have any relations with *Nacella*, as restricted.

The species is rare at Sitka and Monterey and very common at Vancouver.

Subgenus COLLISELLA *, Dall.

*Lottia*, *Acmæa*, *Tectura*,, and *Patella*, sp. auct.

Animal without any vestige of a branchial cordon. Muzzle-frill simple, entire, not produced into lappets or tubercles. Radula with the two inner laterals anterior, approximate, simple, with long cusps; next two posterior, with large, broad usually simple cusps; outer laterals minute, closely appressed and opposed to the cusps of the second pair; pleuræ provided with one or two very minute uncini close to the posterior corner of the area. Formula $\frac{0}{2 \text{ or } 1(2—1.1—2)1 \text{ or } 2}$.

This subgenus differs from *Acmæa* in the simple muzzle-frill, the relative position and unequal size of the lateral teeth, and in the very minute uncinus, which from its small size, is very liable to be overlooked. The fact that the type of the genus

* From *Collis*, a mound; in allusion to their shape.

*Tectura* belongs to the restricted genus *Acmæa*, prevents the use of that name for this group for which it might have been advantageously employed.

The majority of the *Acmæidæ* of the West American coast belong to this section of the genus.

*Section A, with one uncinus.* (*Typica.*)

Type COLLISELLA PELTA, Esch. sp. Plate 14, fig. 6.

*Acmæa pelta*, Esch. Rathke Zool. Atlas, V. p. 19, No. 5.
+ (?) *Acmæa cassis*, Esch., ib. p. 19, No. 4, Pl. 24, fig. 3.
= *Patella fimbriata*, Gld., + *leucophæa*, Rve. + *monticola*, Nutt. MSS. (pars.) + *strigillata*, Nutt. MSS. (pars.) *fide* Cpr.

Soft parts: foot large, long, usually hiding the head when viewed from below; sides of foot smooth, blackish; mantle rather narrow, with a dark, broad, thick edge, furnished with a single row of minute beards or filamentous papillæ; head short and broad; tentacles stout, bluntly pointed, much swollen just above the somewhat constricted base, with a large tubercle at the inner base of each. Frill smooth, slightly crumpled, disk radiately striate with a granular border; mouth transversely oval. Gill short, acutely pointed with strongly marked borders, left margin conspicuously crenate. Inferior lamellæ larger than the upper ones, and the posterior laminæ below much more produced than the anterior ones. Anal papilla prominent, oblique, with a T-shaped orifice, pointing to the right. Infra-anal do. smaller, subcircular, deeply bifid. Renal orifice not elevated, situated some distance to the left of the anal papilla.

Liver small, linguiform. Radula short, forming a double loop on the upper surface of the liver. Crop medium in size, not laminated internally. Generative capsule divided by a deeply impressed transverse sulcus, from below, into two lobes. Formula $1\overline{(2\overline{\overline{\overline{\overline{\overline{\overline{1.1}}}}}}2)}^{0}1$. Female examples had the sac full of ova in different stages of development, but afforded no special evidences of complexity of structure. On the other hand, the same organ in the males was a gland, composed of innumerable small tubes parallel with each other, perpendicular to the wall of the sac at their bases, where they were thick and frequently bifurcated, their internal extremity conical, pointed, and emptying into a central, irregularly-shaped cavity.

The whole structure recalled that of the kidney in vertebrates, but was coarser. The tubes separated readily from one another, were nearly smooth or lightly longitudinally striate; their sheaths

appeared to be composed of fine transversely striate fibres, disposed in wavy bands. They contained a smooth greenish substance, resembling coagulated mucus, and without any trace of organization, under a. $\frac{1}{10}$ Smith and Beck (55°) objective. The specimens here described were obtained at Black Point, San Francisco, in February.

Var. *nacelloides*, Dall, (MSS. 1865). Pl. 17, fig. 36 a–c.

A very distinct variety of this species has exactly the aspect of "*Nacella*" *instabilis* externally. It is of a blackish brown, with sharp, radiating grooves sometimes obsolete near the apex. Several shells beginning in this way have a margin with the normal characters of *C. pelta*. It is quite distinct from the var. *monticola*, Nutt., as described by Dr. Carpenter in the Amer. Journ. Conch., Vol. II, p. 33, and might readily be taken for a distinct species, as the sculpture differs entirely from that of the normal *pelta*, which is sparsely furnished with prominent bulging ribs. I am disposed to agree with Dr. Carpenter (Sup. Rep. p. 533,) in referring *A. pileolus*, Midd., to "probably the young of *A. pelta*;" although I believe it impossible to determine exactly what *pileolus* really was.

COLLISELLA PATINA, Esch. sp. Plate 14, fig. 4.

*Acmæa patina*, Esch., Zool. Atlas, V, p. 19, No. 7, pl. xxiv, f. 7—8. Cpr. Am. Journ. Conch. ii, p. 332.

Var. *normalis, sive pintadina*, (Gld.)

Shell depressed, rounded, with a wide tessellated border, and with the color in stripes or spots more or less tessellated; sculpture of sharp striæ. Soft parts: foot, mantle-edge and muzzle dusky. Top of head, neck and thin part of mantle whitish. Foot oval, thick, stout, sides quite smooth; mantle smooth, with a narrow thickened edge, ciliated, and with fine crenulations corresponding to the striæ of the shell; head short, broad, prominently bulging above. Tentacles moderate, pointed, stout, greatly swelled at the base, with a prominent tubercle at the inner corner of each. Muzzle transversely oval with an even, puckered, scalloped frill; disk entire, radiately striate, mouth transversely oval. Eyes minute, on outer posterior bases of the tentacles. Gill moderately long, subtriangular, with a strong impressed line, forming a border on each side; slightly attached by posterior edges to the mantle above; inserted on the under surface of the hood, above the left side of the head and some distance in front of the commissure between the mantle and neck. Anal tubercle smooth, not very prominent, pointing to the right, close to the right anterior end of the adductor; orifice internally

papillose, infra-anal orifice bifid, to right of anal, on a broad, not prominent swelling. Renal orifice round, minute, hardly elevated, some distance to the left of the anal papilla. The length and stoutness of tentacles differ in different individuals. Some varieties approach very closely to the black variety of *C. scabra.*

Var. *Cumingii*, (Rve.)

Shell elevated, compressed, with a narrow black or slightly spotted border; externally black, with small bluish white spots radiating from the apex and becoming elongated into stripes near the margin, in some individuals; quite or almost destitute of radiating striæ.

Soft parts: foot oval, elongated, smooth, light yellowish, sides a little brown, extreme edge thin, crenate (in alcohol). Thickened mantle-edge smooth, broad, very finely crenulate on extreme edge, with a single row of very fine white cilia; hood longer than in normal variety, very varicose; head prominent, light brownish, stout; muzzle stout, transversely rounded; fringe broad, striate, even, somewhat crumpled; disk radiately striate, bordered with a double row of granulose tubercles, the inner row most prominent; mouth subcircular, somewhat pointed below; tentacles as in normal variety. In most specimens, in alcohol, of this and other species, several impressed longitudinal lines may be noticed, perhaps due to the contraction caused by the preservative; gill moderate, rather longer and narrower than in normal variety; anal and infra-anal papillæ close together at the extreme right, less prominent, but otherwise as in variety *normalis*. Renal orifice minute, rounded, inconspicuous, midway between the gill on the left hand side and the anal tubercle on the right. Radula, as usual in the *Acmæidæ*, in two long double loops on the upper surface of the liver. Formula as in the last.

This variety, if it were not so closely connected by hybrids and intermediate forms with the other, would undoubtably rank as a distinct species. It is a northern form and the northern specimens are uniform and remarkably distinct from the southern *pintadina*. They become inextricably mingled, however, about Sitka, and puzzle the student beyond description. It seems as if several distinct local forms had spread, and at the points of meeting had hybridized until the hybrids and varieties equalled or outnumbered those which adhered to the original types; rather than that all had a common origin in one type. Further researches among the Aleutian Islands and on the east coast of Asia, are necessary, before we can trace the development of these forms with any satisfaction.

Var. *ochracea*, Dall. Plate 17, fig. 35.

There is another very well marked and pretty variety which I should refer to this species, and as it does not appear to have been described, I would propose for it the name of *ochracea;* externally it is of a very light yellowish brown, without spots or rays; internally white with the characteristic dark brown stain of *patina* in the visceral area. The exterior is covered with fine, regularly radiating, close, equal, thread-like riblets, which pass from apex to margin without bifurcation, imbrication or asperities of any kind. These riblets will serve to distinguish it from any of the other limpets of the coast; otherwise it approaches very close to some varieties of *scabra*, and can be traced right into varieties of *patina*. The variation of these limpets appears to be absolutely without limits; you may describe seven hundred forms as easily as seven. The only guide to specific identity is a certain habit of growth, easier seen than described, and very easy to overlook.

The home of the normal form may be said to be the Vancouver district, whence it extends northward to Cape Spencer, and southward to San Diego. The centre of radiation of the variety *Cumingii* is about Kadiák, whence it extends west and north to the Pribylof group in Bering Sea and the Aleutian chain, and south to Vancouver, straggling specimens even occurring about San Francisco. I have dredged it at six fathoms in Unga, North harbor, but they are usually found about tide marks.

Collisella testudinalis, Mull. sp. Plate 14, fig. 13.

*Patella testudinalis*, Mull., Prodr. Zöol. Dan. p. 237, 1766.

Mantle with very fine papillæ around the edge which is colored in accordance with the margin of the shell, variable in different individuals. Tentacles long, slender, sharply pointed; eyes small on the upper posterior bases of the tentacles, which are rather swollen, with a strong tubercle on the inner side of each tentacle. Head large, rounded; muzzle short, with a wide thin puckered frill, not produced into lappets as in *Acmæa;* central disk granulose, mouth subcircular. Gill free all its length, situated in the commissure, between the mantle and neck on the left side, slender, elongate-triangular, pointing toward the right over the head, extensile beyond the edge of the mantle, whitish. Anal papilla obliquely truncate, situated close to the adductor on the right side, orifice internally papillose; infra-anal tubercle close, to the right of anal, minute, somewhat elongated. Renal orifice not detected, probably extremely minute, and to the left of the anal tubercle. Formula $\frac{0}{1(2+1\cdot1+2)1}$.

The minute uncinus is very hard to find and quite variable in form in this species. With care it may be detected, however. This species comes as far south, on the west coast, as Sitka. Here I found it, as well as the variety *alveus*, in great plenty, but of small size. It can pretty readily be distinguished from *C. patina* and, at Sitka, occupies a totally different station. There all the other limpets are found alive only in the vicinity of tide marks, but the *testudinalis* is to be found only in from six to fourteen fms. (south-west of the fish house on the point), on a weedy, gravelly bottom, overgrown with *Zostera* and *Laminaria*. Here all the conditions of ice cold water, stones for the normal form, and weeds for the variety *alveus* abound; while not another species is found in the vicinity except *Lepetidæ* and other deep water forms. Every gradation from the typical *alveus* to the typical *testudinalis* may be obtained. The animals, dentition and shells agree in every particular with those from Grand Manan (Stm.), New Bedford (J. H. Thomson), and Beverly, Mass. (Dall), with which I have compared them.

To the north it may be found in deep water among the Aleutian Islands. I obtained dead ones on the beach of St. George's (Pribyloff Ids) Bering Sea, and on Norton Sound and northward it is the only species. It is best known from the North Atlantic, where it abounds, but no specimens have been obtained, so far as I know, from the Arctic Sea between Lon. 75° and 160° E. of Greenwich. Some interesting facts in regard to migrations of this species are given by Forbes and others.

The position of the gill was not well understood by Williams and Jeffreys. It is situated on the left side of and above the head, and extends across to the right; most figures give an erroneous idea of its construction. The uncinus is very small, and sometimes abortive on some parts of the radula. I have clearly distinguished it, however, in many instances, and it can almost always be found with a high power.

COLLISELLA PERSONA, Esch. sp. Plate 14, fig. 8.

*Acmæa persona*, Esch., Zool. Atlas, v, p. 20, No. 9, pl. xxiv, f. 1 and 2. + *A. radiata*, Esch., ib. No. 8. + *A. ancylus*, Esch., ib. No. 10, pl. xxiv, f. 4—6. + *A. digitalis*, Esch., ib. No. 11, pl. xxiii, f. 7, 8.

*Acmæa umbonata*, Nutt., + *Oregona*, Nutt., + *textilis*, Gld.

Soft parts entirely cream color, except upper part of mantle edge. Foot oval, longer than the body, hiding the head; sides smooth; mantle edge narrow, thickened, upper surface with a few faint maculæ of color like the margin of the shell; smooth, finely ciliated. Head small, wide; tentacles short, thick, stout;

muzzle short, transversely oval; frill very narrow, granulose; disk radiately granulose; mouth semicircular; gill triangular, short, stout, small and wide. Anal papilla large, cylindrical; infra-anal smaller, bifid. Renal orifice to the left of anal tubercle very small, subcircular. Fæces expelled in sausage-shaped pellets. Formula, $\frac{0}{1(2--1\cdot1--2)1}$.

There is a small smooth variety of this species, with tesselated yellowish brown markings and a dark apex, which seems (without a connecting series) very far removed from the typical ribbed form.

The home of this species is in the Vancouver district. A very few were obtained at Sitka, and it may be considered pretty certain that Cape Spencer is its northern limit; it is plenty as far south as Monterey, and extends to San Diego. Habitat between tide marks.

COLLISELLA SPECTRUM, Rve. sp. Plate 14, fig. 10.

*Patella spectrum*, Rve., Conch. Icon. pl. xxix, f. 76 a, b.
*Lottia scabra*, Gld. (pars).

Soft parts: foot oval, sides whitish, smooth, darker toward the edge, sprinkled with black dots and streaks. Mantle whitish with dark patches, and irregular prolongations corresponding to the rays of color and ribs of the shell, edge smooth, ciliated. Gill small, short, triangular, thick, sharply pointed with a strongly crenate border on the left side; head small, anteriorly blackish, behind white; tentacles short, stout, pointed, tips blackish, bases nearly white; muzzle small, produced; disk striate; mouth rounded; frill granulose, narrow; hood rather large; renal orifice not detected; anal papilla small, conical, pointing to the right; infra-anal bifid, larger than and to the right of the anal tubercle. Formula as in the last.

This is a more southern species than most of those previously mentioned. The northern limit of its authentic habitat is Bodega Bay (Stearns), but it extends southward into Lower California, and is sufficiently common at Black Point, San Francisco Bay, and Monterey. It is a very sedentary species, invariably assuming the form of the rough crystalline surface of the rocks upon which it lives. It is also more confined in its station, keeping nearer low water mark than most of the other species.

COLLISELLA SCABRA, Rve. Plate 14, fig. 12, 12a.

*Patella scabra*, Rve., Conch. Icon. pl. xxxvii, f. 119 a, b, (not *scabra*, Gld.)

Soft parts: foot oval, sole light yellowish or ashy, sides almost

black; mantle with a narrow, brown, thickened border, with minute serrations corresponding to the striæ, and dots to the rays of color, of the shell; furnished with minute cilia on the extreme edge. Tentacles short, rather slender, almost black, tips under side and swollen base, whitish. Eyes very small, on outer bases of tentaculæ; head small, very dark slate color or blackish; muzzle short, dark; frill light yellowish white, crenate; disk dark, granulose, with a few papillæ on the upper anterior edge; mouth rounded. Gill very long, narrow and slender, attached to the under surface of the hood on the left side before the commissure of the neck and mantle; pointing toward the right. Anal papilla prominent, infra-anal smaller; renal orifice exceedingly minute, circular. Formula as in the last.

The color of this shell varies from almost black to light yellow brown; there is a variety of *patina* which closely approaches the dark variety.

It is also one of the more southern forms; two or three of the dark colored form were obtained at Victoria, Vancouver's Island, by Robert Kennicott. I have others from Port Orford, W. T. (Capt. E. E. Smith), and Stearns reports it from Bodega and Baulinas Bays. It is common near the heads of San Francisco Bay, and abundant at Monterey; yet in all these localities it is less plentiful than *C. pelta* or *patina*. It ranges southward to Lower California, and possibly to Mazatlan.

Collisella asmi, Midd. sp. Plate 14, fig. 7.

*Patella asmi*, Midd., Mal. Ross. ii, p. 39, No. 13, pl. 1, fig. 5.

Soft parts dark green. Mantle with a narrow thickened edge. Foot small, oval. Head very small. Formula, $\frac{0}{1(2-1\cdot1-2)1}$.

The above notes were taken from a dry specimen kindly communicated by Dr. Carpenter, from which the radula was obtained.

This species has long been a puzzle to conchologists. Most of them have regarded it as a variety, caused by a peculiar habitat, of some other species.* I am inclined to regard it as distinct, as the teeth show differences in detail from any of the other species. I have seen a few specimens of *pelta* and *patina* in which the apex was elevated, conical and black, which were supposed to be proof that *asmi* was only a form of one of them; but I confess I was unable to see that the malformed *pelta* or *patina* had anything more than a slight resemblance to

* Mr. Jeffreys suggests (Brit. Conch. iii, p. 249) that it is a variety of *Acmæa virginea*, but it has hardly a character in common with it.

*C. asmi*, and none of the specimens alluded to approached the latter in solidity, were as roundly conical, or were as smooth as the typical *asmi*. Very perfect specimens of the latter show under a strong magnifier exceedingly fine, close grooves, which are usually invisible to the naked eye, and are different from the sculpture of either *pelta* or *patina*. Mr. Stearns found numbers of specimens attached to *Chlorostoma funebrale*, and it has not been found alive anywhere else. Its range, as far as known, is from Sitka to Santa Barbara Island, and it is rare everywhere, but perhaps most common at Monterey.

COLLISELLA MITELLA, Mke. sp. Plate 14, fig. 9.

*Acmæa mitella*, Mke., Zeitschr. f. Mal. 1847, p. 187, No. 43.
*Patella navicula*, Rve., Conch. Ic. pl. 40, f. 130 a, b. 1854.

The dentition of this species was obtained from a very small dry specimen. Dr. Carpenter describes the shell, (Maz. Cat. p. 210). It has, as far as I am able to discover, been reported only from Mazatlan and the Gulf of California.

COLLISELLA STRIGATELLA, Cpr. sp. Plate 14, fig. 5.

*Acmæa strigatella*, Cpr., Ann. and Mag. N. Hist. 3d ser. xiii, 1864, p. 474.
*A. strigillata*, Cpr., Sup. Rep. 1863, p. 618, No. 17.

The dentition of this species was also worked out from a small dry specimen, which afforded no details in regard to the animal. It is reported from Cape St. Lucas, where it was collected by Xantus.

COLLISELLA FASCICULARIS, Mke. sp. Plate 14, fig. 11.

*Acmæa fascicularis*, Mke., Zeitschr. f. Mal. 1851, p. 38, No. 134.
*Patella opea*, Rve., + *A. mutabilis*, Mke. (pars).

A similar remark will apply to this species. It has been obtained from Cape St. Lucas, Margarita Bay, Mazatlan, and the Gulf of California generally. In this species and *C. mitella* the specimens from which the teeth were obtained were so very minute that the accessory uncinus could not be clearly made out, and hence is omitted in the figure. An examination of the adult radula would doubtless disclose them, as in the allied species.

COLLISELLA PALEACEA, Gld. sp.

*Acmæa paleacea*, Gld., Mex. and Cal. Shells, p. 3, pl. 14, fig. 5. Cpr., P. Z. S. 1856, No, 40.
Some specimens of the animal of this species, which I owe to

the kindness of Mr. R. E. C. Stearns, came too late to be figured, but the radula, as I suspected, is that of a typical *Collisella*. The uncinus is straight, slender and exceedingly small. The animal appears to have been pellucid, with a black spot on the front of the head. The tentacles are rather short, the eyes very black and large, and the mantle edge smooth. The whole creature is extremely compressed laterally, from its habitat.

Collected at Monterey, Santa Barbara and San Diego.

Collisella (?) depicta, Hinds.

*Patelloida depicta*, Hinds, An. N. Hist. x, 1842, p. 82, pl. vi, fig. 4.

This species and the last are certainly very different from the true *Nacellæ*, and should not be referred to that genus. They owe their elongated and compressed form to their restricted habitat (on a Zostera-frond), but, unlike *C. alveus*, cannot be referred to any species now known, of the usual oval form. It is probable that this species also will be found to belong to this genus. It is quite likely that thorough dredging would result in procuring non-compressed specimens, which might have grown on pebbles, &c., as in the case of *C. testudinalis*, var. *alveus* (Couth.), which I obtained of all forms at Sitka, and also the next species. Habitat from Santa Barbara to San Diego.

Collisella (?) triangularis, Cpr.

*Nacella (? paleacea* var.) *triangularis*, Cpr., Proc. Cal. Ac. Sci. iii, p. 213, 1866.

Compare *Patella pygmæa*, Dunker, Moll. Jap. p. 24, pl. iii, f. 20, 1861.

The soft parts of a single live specimen, examined at Monterey, appeared to resemble the other species of this genus; unfortunately, it was afterwards lost, and the opportunity of examining the dentition with it. Some twenty specimens were obtained at the same locality. These were exceedingly interesting, as they presented every variation in form, from wide, oval and nearly flat, to narrow, triangular, high and very compressed. The extreme apex is almost always black. It is usually furnished with a few dark brown stripes, radiating from near the apex but seldom reaching the margin in adult specimens; these, however, are wanting in some specimens. In all its forms it is a well marked species, and, while resembling Dunker's species, cannot be united with any now known from the California coast. It is known from Monterey and Baulinas Bay; I obtained a single dead specimen at Sitka. Dr. Carpenter proposes to rename this form specifically "*casta*" and to apply the term "*tri-*

*angularis*" to the compressed variety only; it is doubtful, however, if such a course would be admissible, as every transition in form can be observed in a very few specimens.

COLLISELLA ATRATA, Cpr. Plate 14, fig. 15, 15a.

*Acmæa* (? var.) *atrata*, Cpr., An. Nat. Hist. 3d ser. xiii, p. 474, 1864.

Mantle edge nearly smooth, narrow; head small; tentacles very short and stout; gill small, broad and short; muzzle small, somewhat produced. General hue yellowish. Intermediate between *discors*, Phil., and *floccata*, Rve. (Cpr. loc. cit.), all being probable varieties of one species. Cape St. Lucas, Acapulco.

COLLISELLA PEDICULUS, Phil. Plate 15, fig. 16.

*Patella pediculus*, Phil., Zeitschr. für Mal. 1846, p. 21, No. 8. Cpr., Maz. Cat. p. 200, No. 260.
*Patella corrugata*, Rve., Conch. Icon. pl. 40, f. 132.

Animal small in proportion to the size of the shell; mantle margin nearly smooth, puckered to fit the angles of the ribs; head small, short; muzzle moderate; tentacles very short, stout, pointed. Gill wider than long, triangular, short; hood large and produced.

It was with some surprise that I observed the well marked gill on the neck of this species, as the shell characters were essentially those which have been usually regarded as patelloid. But the present case and that of many other species, afford good evidence of the worthlessness of the shell characters in this group as indications of affinity.

The young of this species is indistinguishable from "*Patella*" *discors*, jun. In the adult *discors*, however, the ribs become evanescent and usually disappear entirely. The sculpture is identical in both, barring the ribs, as is the apex in most cases. Still the aspect of the adult is generally sufficiently distinct to be readily recognizable, so that we can well afford, in the absence of any knowledge of the animal of *discors*, to consider the two forms distinct. The shells of *pediculus*, according to Dr. Carpenter, are much like young *Ancistromesus Mexicanus;* the animals, however, belong in different families. The habitat of the present species is on the Mexican coast from Acapulco to Mazatlan.

COLLISELLA SUBRUGOSA, D'Orb. Plate 14, fig. 14.

*Acmæa subrugosa*, D'Orb., Voy. Amer. Merid. vol. v, p. 479, No. 442, 1847.

*Lottia onychina*, Gld., Moll. U. S. Ex. Ex. p. 355, fig. 461, 461a, and b, 1852.

Animal yellowish; mantle greenish, with brown markings upon the border, ciliated; head and tentacles rosy. Hab. Rio Janeiro, Brazil.

The soft parts of this unpretending little shell agree in all essential particulars with the west coast species.

COLLISELLA (?) ROSACEA, Cpr.

*Acmæa (? pileolus* var.) *rosacea*, Cpr., Proc. Cal. Acad. Sci. iii, p. 213, 1866.

Common at Monterey (50 sp. Dall), and reported from San Diego.

The type specimen of this species is now before me. After a careful study of it, I would add to Dr. Carpenter's diagnosis the following remarks:

The shell is small, obtusely conical with an erect, subcentral apex. The ground color of the surface is a translucent white, suffused with rose toward the margin, where several indistinct rays of rose color appear. These are more evident on the inside. The extreme nucleus is usually white. The apex is profusely dotted with minute dark brown and opaque white specks of color, which are not rays, nor are they often arranged with any regularity; these are more numerous on the posterior portion of the shell, but vary exceedingly, from a dark reticulated brown network of lines to wavy irregular pencillings or sparse brown dots, usually most plenty on the interspaces of the ribs. The surface is smooth, especially in front, but from the apex radiate (especially on the posterior half of the shell) a number of very marked riblets which appear as if indented from below, and do not materially interrupt the smoothness of the surface, though the margin is rendered slightly crenulate by them. They are also of a more opaque white than the remainder of the shell, and sometimes form conspicuous white rays.

This species is a southern form and has not been found north of Monterey as far as recorded. It is somewhat confused, on account of having been confounded with small dead specimens of *Liriola peltoides*, (Cpr.) Dall, which have a general resemblance to it in form and color, though otherwise very distinct.

The latter much more nearly resembles *Acmæa virginea* than does the true *rosacea*, which is a very different shell.

On comparison, we find that *rosacea* wants entirely the characteristic brown rays of *virginea*, the apex of *rosacea* is much

more central, blunt and erect; the shell is less convex, polished and delicate, though smaller than *virginea*; and if the two were found in the same locality they would both be recognized by most conchologists as distinct species. A shell which is more nearly allied to, though very distinct from, *rosacea*, is *Patella punctuata*, (Lam.) Rve., Icon. No. 122, from Honduras and Aspinwall. Still closer is *Acmæa* (*Collisella?*) *æqualis*, Cpr. MSS. from the Gulf, yet it seems to be distinct, from the single dead specimen known to me.

I have doubts as to the genus of this species, which may be a patellid.

"*Acmæa pileolus*," Midd., I believe to be a variety of *pelta*, as Dr. Carpenter suggests; at all events the figure and diagnosis do not give any characters common to this or any other of the southern species. Dr. Carpenter says that the types (in Mus. Cuming) of Middendorf's species are *rosacea*, yet I believe with him, that some mistake has certainly occurred; as *rosacea* is not to be found at Sitka, the locality of *pileolus*, and the description and figures cannot be reconciled.

This name of Middendorf's had better be dropped entirely, as it is impossible to determine, with certainty, what his shell was, and its retention can only create confusion.

COLLISELLA ARAUCANA, D'Orb.

*Patella araucana*, D'Orb., Voy. Am. Mer. v, p. 482, No. 448, ix, pl. lxv, fig. 4—6.

The animal of this variable species is brownish, and agrees in every essential particular with the other known species of this section. The uncinus is short and somewhat notched or bifid at the extremity. The specimen examined came from the Chilian coast near Valparaiso.

COLLISELLA (?) SYBARITICA, n. sp. Plate 17, fig. 34.

Shell depressed, thin; apex subcentral, more anterior in the young. General shape rounded oval, hardly more narrow before than behind. Surface nearly smooth, with rounded concentric lines of growth; in young specimens a few faint, hardly noticeable elevated radiating lines or riblets may be observed near the margin, which is entire. Internally smooth, border polished and also the cavity of the apex above the muscular impressions. Color a clear rose pink, varying from quite deep and a little livid in some specimens, especially the young, to a very faint pink. Apex white, even in very young specimens entirely uneroded, rather blunt and inconspicuous; sides of the shell ornamented with rays of a darker shade of pink, more or less gathered in groups, and

more or less evident, according to the shade of the remainder of the shell. Internally, the visceral area is bluish white, usually washed with a faint yellowish brown, often hardly evident; in which case the area is whitish; the successive layers of brown sometimes appear externally around the apex when eroded. The inner margin, and to some extent the whole interior, exhibit the external markings or rays, through the somewhat pellucid shell. Texture hard and brittle. Epidermis exceedingly thin, usually evanescent; translucent brownish. Soft parts unknown.

Long. of largest specimen ·6 in. Lat., 1·46 in. Elevation, ·2 in.

This is a deep water species, at least in Bering Sea. I found an abundance of beach specimens at St. George's Island, of the Pribyloff group. Capt. E. E. Smith obtained two specimens on the beach of False Pass, Aliaska Peninsula, near Mt. Isanotsky. Dr. Carpenter writes that he had obtained young individuals, probably of this species, from Japan.

The pattern of coloration is entirely different from *Collisella (?) rosacea*, Cpr., both inside and outside; it is more depressed, and grows much larger than that species, which is subtropical, while this is sub-boreal. From *Acmæa virginea*, Mull., it differs in form, texture, color and pattern of coloration. I know of no other species with which it can be compared.

Cab. Dall, Carpenter, Smithsonian Institution, and Academy of Natural Sciences, Philadelphia.

Acmæa (?Collisella) hieroglyphica, n. s. Plate 17, fig. 37.

Shell small, stout, rugged, with a subcentral, more or less eroded, apex; moderately elevated. Muscular impression pyriform, shape of shell ovate; exterior with rather strong white ribs, 14—20 in number, with riblets between them; interspaces brown. Striæ of growth somewhat imbricated, less prominent on the ribs. Internally white, with brown maculæ on the margin corresponding to the brown interspaces of the exterior. Margin strongly crenulated. Spectrum pyriform, with the smaller end anterior, consisting of a sharp black line forming a pyriform figure, with three longitudinal black lines inside of it. In the larger specimen these have a faint bluish halo about them, but in the smaller they are simply black on a white ground. The same figure of less size is conspicuous on the outside of the eroded apex. Soft parts unknown. Lon. ·4, lat. ·3 in.

*Hab.* China. Cab. Dall and Acad. Nat. Sciences of Phila.

This very peculiar and characteristic little shell was found in one of those boxes of Chinese shells sold in the tea-shops of San

Francisco. It is unlike any species figured or described in the works at my command, and I know of no species with which it might be compared. It belongs to the same group as *C. spectrum*, Reeve, as far as the shell goes, but resembles it very slightly. The peculiar spectrum resembles a Chinese character or hieroglyphic, from which I have taken the specific name.

*Section B ; with two uncini.* (*? Collisellina*).

COLLISELLA SACCHARINA, Linné. Plate 15, fig. 18.

*Patella saccharina*, Lin., Syst. Nat. Ed. xii, p. 1258. Ed. Gmel. p. 3695. Lam., An. sans Vert. Ed. Desh. p. 527, No. 7. Adams, Chenu, &c.

*Astrolepas*, Argenville, Conch. t. 2, fig. M.

*Acmæa saccharina*, Hanley, Wood's Ind. Test. 2d ed. 1856, p. 185, No. 17.

*Patella lanx*, Rve., Conch. Icon. pl. xxx, f. 82, 1855.

*? Patelloida stellaris*, Quoy and Gaim. (non Rve).

Mantle edge smooth, narrow, puckered to fit the ribs of the shell. Head small ; muzzle short ; tentacles very small, rapidly tapering to a very sharp point ; hood much produced ; gill stout, moderately large, broad and pointed ; foot oval, thin. Colors yellowish ; sides of foot dark, muzzle blackish, back of head and tentacles nearly white, mantle edge with a mottled dark border. Formula, $\frac{0}{2(2-1\cdot1-2)2}$.

*Hab.* Indo-Pacific, Amboyna, Japan.

My surprise was great when I found this well-known species, which is tabulated as a "*Patella*" by the most recent authors, to belong to the Acmæidæ ; but it was still further increased when, accidentally referring to that excellent and very accurate work, Hanley's edition of the *Index Testaceologicus*, I found that Mr. Hanley had anticipated me in the discovery, and it was there referred to the genus *Acmæa*.

This and the following species exhibit a peculiarity worthy of notice, in the duplication of the uncinus. For a long time I thought that my eyes were deceived, and that there was but one, which was folded or twisted so as to give the effect of a double cusp, but I found the uncini separated, and lying side by side, after handling the radula, so that I could no longer doubt it.

COLLISELLA BORNEENSIS, Rve. Plate 15, fig. 17, and pl. 17, fig. 38, a, b, c.

*Patella Borneënsis*, Reeve, Conch. Icon. pl. xxxvi, f. 113, a, b. (bad). Identified from specimens. Borneo.

*Acmæa Bickmorei*, Dall, MSS. Amboyna.

Mantle edge thick, with a single row of rather stout papillæ interspersed with smaller ones irregularly disposed; sides of foot smooth; foot oval, thin, rather small; muzzle and edges of foot dusky; back of head, bases of tentacles and mantle edge yellowish. Head stout, short, rounded; tentacles short, small, rapidly tapering to a sharp point; in the alcoholic specimens invariably hooked, or with the tips recurved. Muzzle rather transverse, surface radiately papillose, frill conspicuous, smooth and even. Gill very large and long, usually protruded across the neck nearly to the mantle edge. Anal and infra-anal apertures on a prominent pointed tubercle; renal not observed. Uncini larger than usual. Formula, $\frac{0}{2(2-1\cdot1-2)2}$.

This species was obtained it abundance at Amboyna, by Mr. Bickmore.

The muscles which retract the radula are transversely striated. See Silliman's Am. Journ. Sci. and Arts, Feb., 1871, p. 123. Since that time a similar state of things has been observed in *Collisella palæacea*, Gld. These are the first instances of such fiber noticed in the class *Gasteropoda.*

Genus LOTTIA, Cpr. ex Sby.

*Lottia* (Gray MSS.), Sby., Gen. Shell, part 42, fig. 1. Reeve, Conch. Syst. f. 1, 1842.

*Tecturella*, Cpr., Smithsonian Check List, W. C. Shells, 1860, p. 3, No. 176. Rep. Br. Assoc. 1861, p. 137.

*Tecturina*, Cpr., Smiths. Rep. 1860, p. 219. Lect. Moll. Ind. Ed. p. 71 = err. typog. for *Tecturella?*

*Lecania*, Cpr. MSS.

*Lottia*, Cpr., Journ. de Conchyl. vol. xiii, p. 140, 1865. Am. Journ. Conch. vol. ii, p. 342, 1866. Sup. Rep. Brit. Assoc. 1863, p. 650, No. 249.

Animal with a single cervical branchia; also furnished with a branchial cordon of laminæ between the mantle edge and the foot, extending as far forward as the adductor muscle on each side, and continuous behind. Teeth and muzzle frill as in *Collisella.* $\frac{0}{1(2-1\cdot1-2)1}$.

Type LOTTIA GIGANTEA. Plate 15, fig. 20.

*Lottia gigantea*, Sby. *apud* Gray. Gen. Sh. pt. 42, f. 1.
*Acmæa scutum*, auct. non Esch. nec D'Orb.
*Tecturella grandis* (Gray) Cpr.

The shell of this species has been fully described by Dr. Carpenter in his admirable paper on the Acmæidæ, before cited; it only remains to give a few additional notes on the animal. I

obtained more than a hundred specimens on the rocks, between tides, at Monterey, California, in the month of January, 1866. At this time they were well filled with ova, and all the specimens obtained contained ova; not a single male came to hand.

The foot is oval, thin, dull waxen below; sides of foot smooth, black, the extreme edge pellucid white or yellowish; the whole nearly as long as the shell. Mantle thin, extending little beyond the foot on the sides, but some distance beyond the head in front; edge thickened, smooth, whitish, with a crowded row of fine blackish papillæ on the extreme edge; another of larger and more distant papillæ inside; and lastly a row of still larger ones inside of the last, placed opposite the spaces between the papillæ of the second row, and somewhat further apart. The branchial lamellæ exactly resemble those of *Patella vulgata*, as described by Dr. Williams, but are somewhat less crowded and of a pellucid wax color. They are equal on the sides and behind, but diminish in size on each side of the head, and are interrupted in front for a space as wide as the head. The gill is elongate-triangular, quite large, attached by both edges for a short distance to the mantle above it, forming a shallow bag-shaped cavity; it is curved a little to the right and is inserted to the left of the neck, in the commissure between the neck and the mantle. In structure it is a flat plate, with rounded, striated edges, bounded by an impressed line, which is stronger on the under side. Inside of this line, above and below, extend a series of equal tranverse laminæ, less strongly marked toward the apex of the gill, which is smooth and produced at the tip. A nerve and blood-vessel pass along the left edge of the gill; the laminæ are hollow and profusely furnished with blood-vessels. The hood above the gill is also extremely vascular.

On the right side of the neck is a smooth subcylindrical anal papilla, obliquely truncate, so that the foramen opens toward the right side of the animal. From the foramen project forty or fifty long, slender, cylindrical, white papillæ or tentaculate processes, but they originate inside of the edge of the aperture, which is entire and closed by a subspherical process of the integument. The renal organ opens to the left, outside of this papilla, through a very minute non-elevated orifice, in which it differs from *Patella vulgata*. To the right of the anal papilla is a rounded tubercle, with a semilunar orifice. There are no other papillæ or tubercles in the vicinity, nor could any "capitopedal orifices" be detected as described in *Patella* by Lankester. The head and tentacles are whitish below and black above, but the black color does not extend behind a line drawn from the

inner corner of one tentacle to the other. Behind that line both head and tentacles are whitish.

The tentacles are short, stout, acutely pointed, and somewhat granulose. The eyes are very small on the outer edges of the tentacles, which have a prominent tubercle on the inner edge of each.

The muzzle is short, stout, and transversely oval. Its outer edge is somewhat striate and produced into a frill. Inside of this, around the circular mouth, the disk is granulose and deeply radiately furrowed. Just inside the mouth, the edge of the jaw is perceptible, and arches over the lateral lips of the buccal mass.

The viscera are small in proportion to the size of the animal. The ova were of a greenish color. The renal organ extended over a fourth of the area of the back between the muscles.

The range of this species is from the vicinity of San Francisco to Central America. It is especially abundant and fine at Monterey. Some of the specimens which I obtained there were nearly three inches long. Put into a pitcher half full of sea water, with a number of other mollusks, the majority of this species crawled out during the night and were found on the outside of the pitcher, and even on the wooden floor, in the morning.

Genus SCURRIA, Gray.

*Scurria*, Gray, P. Z. S. 1847, p. 158. Guide, Moll. p. 171. Chenu, Man. de Conchyl. i, p. 375.

< *Scurria*, Möerch, Cat. Yoldi, p. 145, 1852. Cpr., Lect. p. 71. H. and A. Ad., Gen. Rec. Moll. i, p. 460.

< *Acmæa*, Woodw., Man. p. 155.

*Scurra*, Gld., Expl. Exp. Moll. p. 357, *non* Esch.

*Acmæa*, sp. D'Orb., Voy. Am. Merid, v, p. 478, 1846.

*Helcion*, sp. ib., p. 703 !

*Lottia*, sp. ib., pl. 64, vol. ix ! !

Not *Scurria*, Cpr., Am. Journ. Conch. ii, p. 345 = *Acmæa* sp.

Animal with an accessory branchial cordon extending entirely around the body between the mantle and the foot. Teeth resembling *Collisella* A. Formula $\frac{0}{1\,(2-1\cdot 1-2)\,1}$.

In this genus the cordon is complete as in *Patella*, while the dentition and branchial plume show its true place to be in the *Acmæidæ*. There does not appear to be any grounds for the distinction drawn by Dr. Gray between the cordon in this genus and that of other *Patellæ*. In *Scurria mesoleuca* they are absolutely identical in form and arrangement with those of *Lottia*, excepting that they are not interrupted in front as in that genus.

Type SCURRIA SCURRA, Lesson sp.

*Patella scurra*, Lesson, Voy. Coq. Zool. p. 421, No. 189, 1830.
*Acmæa scurra*, D'Orb., Voy. Amer. Merid. v, p. 478, pl. lxiv, fig. 11—14.
*Scurria scurra*, Gray, P. Z. S. 1847, p. 158. Guide Moll. p. 171. Chenu, Man. de Conchyl. i, p. 375, fig. 2812. H. and A. Ad., Gen. Rec. Moll. i, p. 460, iii, pl. lii, fig. 4, a, b.
*Lottia pallida*, Sby., Moll. Beechey's Voy. p. 147, pl. xxxix, f. 1, 1839. Not *Patella pallida*, Gould.
*Lottia conica*, Gld., Moll. U. S. Expl. Exp. p. 346, (pars).
Not *Acmæa mitra*, Esch., (Zool. Atlas, ed. Rathke v, p. 18,) as aver Gray and Adams.
*Acmæa mitra*, Alcock, (MSS.), in Am. J. Conch. ii, p. 345 not Eschscholtz.
*Lottia scurra ?* Gld., Expl. Exp. Moll. p. 356.

Soft parts yellowish white for the most part; foot large, suboval, smooth; mantle edge thickened, smooth, finely fringed with short marginal cirri; head very large, of a rosy tint; muzzle short, frilled; tentacles large and slender, faintly roseate, with very minute black eyes at their lateral and posterior bases. Branchial lamellæ resembling those of *Patella*, but rather more distant, erectile; gill very stout, thick, with a rather broad border formed by an impressed line on each side; lamellæ prominent, apex pointed.

Shell buff, outer layer of a waxen translucency, inner layer porcellanous white, with narrow margin resembling the external layer. Form conical; apex usually minute, sharply pointed, anteriorly directed, (not blunt and erect, as in *Acmæa mitra*); anterior and posterior slopes convex (seldom or never concave, as is frequent in *A. mitra*); aperture roundly oval, slightly narrower in front, external surface covered with fine, regular, even striæ, like threads radiating from the apex (very different from the rough, irregular, bifurcating riblets of the varieties of *A. mitra*); internal surface of a peculiarly glossy white, scored with more or less strongly marked radiations from the apex; margin obsoletely crenulate inside; apex often white, but not uncommonly marked with brown streaks on a white ground, radiating from a dark brown nucleus and divaricating; apex of this young fry strongly recurved, nearly marginal, without any trace of a spiral nucleus. The concentric lines of growth are more or less strongly marked but usually rounded and obsolete.

Habitat from 12° to 41° s. lat. on the west coast of South America. It lives on the roots and stalks of fuci (*Macrocystis*),

and excavates a shallow cavity therein. According to D'Orbigny, it is not uncommon.

I have not been able to examine the soft parts of this species and rely on Gould, Couthouy and D'Orbigny.

SCURRIA (?) ZEBRINA, Lesson sp.

*Patella zebrina*, Less., Zool. Coq. 1830, p. 417, No. 180.
*Patella concepcionensis*, Less., loc. cit. p. 418, No. 182.
*Lottia zebrina*, Gld., Moll. Expl. Exp. p. 352, pl. 30, fig. 460, 460a.
*Lottia variabilis*, Gray, Moll. Beechey's Voy. p. 147, pl. 39, fig. 3—5, 1839.
*Patella zebrina*, D'Orb., Voy. Amer. Merid. v, p. 480, No. 445, pl. lxv, f. 1—3.
*Tectura zebrina*, Gray, Guide p. 171.

D'Orbigny describes and figures this species as having a complete cordon of strongly marked branchial lamellæ; Couthouy speaks of "an encircling series of slight protuberances, which appear to communicate with the cirri, and at first look like branchial lamellæ; at times very apparent, at others hardly visible," while calling attention to the long and large gill. Gray speaks of them as "fleshy beards" inside of the mantle, rather distant and continuous over the head. On the whole, the evidence is sufficiently full to justify us in placing the species in this genus, at least provisionally.

SCURRIA MESOLEUCA, Mke. sp. Plate 15, fig. 19.

*Acmæa mesoleuca*, Menke, Zeit. für Mal. p. 38, No. 135, 1851. Cpr., Maz. Cat. p. 203, No. 263.

Soft parts mostly of a greenish tinge; foot oval, thin, smooth; sides of foot quite smooth, edge thin, somewhat produced; mantle edge thickened, narrow, marked with dark brownish spots or streaks corresponding with the rays of color on the shell, irregularly bearded with a few papillose projections. Branchial lamellæ forming a complete cordon just inside of the mantle edge. Laminæ close, crowded, equal all around, in structure exactly agreeing with those of *Patella* and *Lottia*, a little more puckered at the edges, perhaps from the effects of the alcohol. Head small; muzzle short, transversely oval, with an equal, narrow, somewhat puckered frill all around. Disk radiately striate, mouth circular, entire. Tentacles very short, stout, bluntly pointed; bases slightly swelled, not tuberculate; eyes small, on the superior part of the bases of the tentacles. Gill like that of *Lottia*, but smaller, shorter, and relatively

broader. Anal papilla small, resembling that of *Lottia;* infra-anal papilla broader, bifid; renal orifice small, subcircular, not elevated, some distance to the left of the anal. Formula $\frac{0}{1\,(2-1\cdot 1-2)\,1}$.

The shell has been well described by Menke and by Dr. Carpenter in the Mazatlan Catalogue, with copious synonymy. From the latter, however, *Acmæa personoides*, Mid., should be eliminated, as it came from Cook's Inlet where *S. mesoleuca* is unknown. The former is probably only a variety of *patina*.

The range of this species is from Central America to Lower California. It is plenty in the Gulf, and I collected several hundred specimens at San Juan del Sud in Nicaragua, in the course of half an hour. It inhabits the rocks between tide marks.

## Family PATELLIDÆ.

*Patellina*, McGillivray, Moll. Aberdeen p. 66, 1843.

< *Patellidæ*, Woodw., Man. p. 153. Cpr., Rep. Br. Assoc. 1856, p. 318. Jeffreys Brit. Conch. iii, p. 229 (in *Pectinibranchiata !*) Binn. Inv., Mass. Ed. ii, p. 267. D'Orb., Moll. Can. 1837.

< *Patelloidea*, Risso, Hist. iv, p. 260, 1826. (Not Fer., Rang or Mke.)

< *Patellina*, Wiegm., Handb. der Zool. p. 546, 1832. Milne-Edwards, Conch. Textb. Ed. vi, p. 197.

< *Patellæ*, Fer., Tab. Syst. p. xxxvii, 1821. Rang, Man. p. 251, 1829. Desh., Enc. Meth. iii, 1830.

< *Patellacea*, Mke., Syn. Ed. ii, p. 90, 1830. Forbes, Mal. Monensis, p. 35, 1838.

< *Patellaceæ*, Menke, Syn. 1828, olim. Hinds, Voy. Sulph. Zool. p. 53.

< *Patellidæ*, Guild., Zool. Journ. iii, p. 535, 1828.

< *Phyllidiana*, Lam., Phil. Zool. 1809. Gld., Inv. Mass. Ed. i, p. 146.

> *Patellidæ*, Gray, Guide Moll. p. 173. Chenu, Man. de Conchyl. i, p. 376.

*Patellidæ*, Cpr., Maz. Shells, p. 199. H. and A. Ad., Gen. Rec. Moll. i, p. 463. Cpr., Sm. Rep. 1860, p. 219. Lect., Moll. 2d ed. p. 71. D'Orb., Voy. Am. Mer. v, p. 480, 1842.

Animal destitute of a cervical branchia but provided with a more or less complete cordon of branchiæ in the form of laminæ attached to the mantle between its thickened edge and the sides of the foot. Radula provided with three lateral teeth on each

side and three uncini. Rhachidian tooth rarely present. Muzzle without a frill.

Genus ANCISTROMESUS,* Dall.

*Patella* sp., Auct.

Animal with a complete branchial cordon, the lamellæ long and slender, subequal; sides of foot smooth; radula furnished with a simple rhachidian tooth; the two inner laterals on each side anterior to the third pair, which are large and quadridentate. Uncini simple. Shell very large in the adult.

Type ANCISTROMESUS MEXICANUS, Dall ex Brod. Pl. 15, fig. 21.

*Patella mexicana*, Brod. and Sby., Zool. Journ. vol. iv, p. 369. Rve., Conch. Icon. *Patella*, pl. i, f. 1.

Animal generally blackish, more or less marbled and streaked with white. Head, mantle edge and branchial lamellæ black. Head very long, not large in proportion; muzzle small. Tentacles short, slender, pointed. Branchial lamellæ not semicircular, as in most Patellæ, but produced, twisted, and elongated, having, upon a superficial examination, an arborescent appearance. They are very slightly smaller in front. Radula with a well developed median tooth. Cusps of the teeth fawn color, with chestnut brown bosses and an orange ring at the point of insertion of the cusp. Formula, $\frac{1}{3(1/4-2\cdot2-1/4)3}$.

Shell white, inside and out, sometimes with a rusty or greenish stain here and there, and furnished with obsolete radiating ribs. Often attaining a length of from eight to fourteen inches.

This magnificent limpet, the largest non-spiral gasteropod now living, proved, as might have been anticipated, to differ essentially from its smaller cousins. It is found in Central America. The radula figured was from an Acapulco specimen. It is somewhat singular that the animal of a nearly white shell should be almost black, especially as the shell is an external one. I have seen the latter frequently used as a wash-basin, in Central America.

Genus PATELLA, Linné.

*Patella*, Auct. omn. binom. *P. vulgata*, type.

*Patella*, Lam., Prodr. 1799. *P. granularis*, type. Syst. An. s. Vert. ed. 1801. *P. testudinaria*, type.

< *Patella*, Lin., Syst. Nat. 1758, ed. x. H. and A. Ad., Gen. Rec. Moll. i, p. 464. Cpr., Lect. Moll. p. 71. Gray, Guide, p. 174. P. Z. S. 1847, p. 168. Woodw., Man. p. 154. Schum., Essai, 1817.

* From Αγκιστρον, a hook or claw, and Μεσηδς, middle.

*Scutellastra*, H. and A. Ad., Gen. Rec. Moll. i, p. 466. Chenu, Man. de Conchyl. i, p. 377.

*Cymbula*, H. and A. Ad., Gen. Rec. Moll. i, p. 466, 1854. Chenu, Man. de Conchyl. i, p. 378.

*Olana* (?), H. and A. Ad., Gen. Rec. Moll. i, p. 466. (*P. cochlear*, Gmel., type.) Chenu, Man. de Conchyl. i, p. 378. Gray, Guide, p. 175. Cpr., Lect. Moll. p. 72.

*Eruca*, Tournefort, Gualteri, Index, 1742 (not Swains.)

< *Patellites* sp., Walch., Naturg. d. Verst. ii, p. 168, 1768. Schröt., Naturförs. v, p. 102, 1775. Waller, Syst. Min. ii, p. 468. Schröt., Lith. Lex. v, p. 112. Schloth., Petrefactenkunde, p. 113, 1820 (= *Patella*, fossil sp.)

< *Patellaria*, Llhwyd, 1698. Schröt., Lith. Lex. v, p. 112.

? *Goniclis*, Rafinesque, Journ. de Phys. 1819, t. 88, p. 426. Mke., Syn. Ed. ii, p. 90 (not *Goniclis*, Raf., Sup. Mon. Biv. Phila. 1831).

*Lepas* sp., Adanson, Voy. Sen. 1757.

*Lepadites* sp., D'Argenville, &c. (foss. sp.)

*Patellus*, Mont., Conch. Syst. ii, p, 66, 1810.

*Lottia* sp., Gray, fide D'Orbigny, Voy. Am. Mer.

? *Patellarius*, Dum.

? *Cellana*, H. Adams, P. Z. S. 1869, p. 274.*

If we take as the type that which (according to the rule adopted by Linnæus) was the most common species known to him, we shall undoubtedly select the *Patella vulgata*, of the northern European seas. The type most commonly cited is that of Lamarck, in 1801 (*P. testudinaria*), but his first type and only species mentioned in 1799 was the *P. granularis*. The former, however, is probably an *Acmæa*. There are two very distinct types of dentition among the true Patellæ, and one of them must be separated by name. As objections might be raised to proposing a new generic name for *Patella vulgata*,† from which I suspect *Patella granularis* may differ considerably, I shall regard the former as the type of the genus, and the position of the latter species will remain to be fixed whenever the animal shall have been examined.

Animal with a complete, uninterrupted branchial cordon between the mantle and the foot; destitute of side lappets on the foot; radula with the first two inner laterals on each side similar, in the same transverse line, parallel; third lateral largest,

* The diagnosis includes no characters of more than specific value. The true place of the species can only be determined when the animal is known.

† I am indebted to Dr. Wm. Stimpson for the opportunity of examining the soft parts of this species.

denticulate, posterior; uncini distinct, similar, three on each side. Formula, $\frac{0}{3(1-2\cdot2-1)3}$.

Type PATELLA VULGATA, Lin. Plate 15, fig. 23.

*Patella vulgata*, Linné, Syst. Nat. Ed. 12, p. 1258. Forbes and Hanley, Brit. Moll. ii, p. 421. Jeffreys, Brit. Conch. iii, p. 236.

Soft parts: foot slate colored, sides smooth, yellowish, somewhat dusky with a pale border; mantle yellowish, edge thickened, furnished with tentacular filaments, varying in length and corresponding in position to the ribs and striæ of the shell, extreme edge sometimes dusky; branchial cordon uninterrupted, laminæ rather smaller in front of the head, of a pellucid yellowish color; head short, stout; tentacles moderate, pointed, yellowish, darker at the tips; muzzle indented below, bordered with granulose papillæ, especially below; disk radiately striate; eyes small, on superior bases of the tentacles; not raised above the swollen base, which has a prominent tubercle on the inner edge; anal orifice on the right side at the junction of the mantle with the neck, prominent, inclined to the right, but not obliquely truncate as in some species, orifice rounded, internally papillose; renal orifice on a small yellowish tubercle to the left of the anal; infra-anal papilla similar, inconspicuous, to the extreme right. Formula, $\frac{0}{3(1\frac{1}{3}-2\cdot2-1\frac{1}{3})3}$.

*Habitat.* British and North European seas from the Loffoden Isles to the Mediterranean.

The minute anatomy of this species still stands in need of much elucidation; and, as one of the best known species of the order, a synopsis of what is known and what is undetermined will give a good idea of the extent of our knowledge of the anatomy of the group.

It does not speak well for English naturalists, that for information in regard to one of the most common of their littoral animals, many points of which have been matters of doubt for many years, we should be obliged to turn to Russian and French publications for the little that has been made known, except in regard to the branchiæ. A few scattered and very short articles by Gray, Lankester, and Patterson, beside the work of Dr. Williams, are about all that English works afford us; while Brandt, Fischer, Milne-Edwards, Lebert, Cuvier and others have done far more, though much remains to be done.

The branchiæ have been thoroughly described by Dr. Williams in the paper before referred to, though a careful dissection of the gill of *Acmæa* is still a desideratum. In *Patella vulgata*

they consist of a row of alternately large and small laminæ, of a suboval shape, flattened or slightly concave on one side, and rather prominently convex on the other; each composed of two walls of very thin vascular membrane united by a somewhat denser layer at the outer border, and filled with fluid (whether water or natural serous fluid being yet undetermined) while they they are still further strengthened by a series of internal fibres which cross each other like the braced timbers of a worked-out mine. The external surface of the branchiæ is ciliated, and the whole mechanism presents analogies with the gills of Lamellibranchs. It is probable that the lamellæ of the gill in *Acmæa*, though differently placed, are of essentially similar construction, while differing in form. The blood is transparent and the corpuscles are very small.

According to Dr. Williams, the lining membrane of the branchiæ is continuous, and it is highly improbable that water penetrates into the system as in some other mollusca. Lankester (An. Nat. Hist. 3d ser. xx, p. 334, 1867) describes two orifices, (capito-pedal), "one on each side of the head, in the angle formed by its junction with the muscular foot, and opening into the blood sinus surrounding the pharyngeal viscera." He also describes a communication which he supposes to exist between the "pericardium and the supra-anal articulated sac," or accessory renal organ.

My opportunities for examination of the present species having been confined to alcoholic and very limited material, I do not assume to speak positively in this matter, but can only say that the most careful search, assisted by injections from within, and the most thorough scrutiny of all the external anterior surface of the animal with a high power, failed to disclose either of the orifices alluded to. Moreover the search was not confined to this species, but was made in every species, and even specimen, examined, with a like result. In *Collisella patina* the heart is situated behind the left side of the head, very far to the left, and entirely away from the renal sac, which last is much smaller than in *Patella vulgata;* hence it appears highly improbable that any communication whatever exists between them; and if this be the case in a species closely allied, it adds to the improbability of the existence of such a communication in the present species. Mr. Lankester's paper is so exceedingly brief that it is not easy to follow his dissections, and it is greatly to be desired that a fuller account, with figures, which he promises, should be published. There is a bare possibility that the contraction of the specimens may have entirely obscured and closed up the openings of the supposed "capito-pedal orifices," or they may not exist in the

Acmæidæ; but, after the examination of a large multitude of specimens, I regret that I cannot confirm his observations in these two particulars.

The nervous system has been examined by Garner, Rhymer Jones and Anderson, and, later and much more thoroughly and correctly, by Brandt (Bull. Acad. Sci. St. Petersburg, Nov. 24, 1868). The whole system is naturally arranged in two groups, the *cerebro-pharyngeal* and the *pedo-branchial* nerves and ganglia. These two groups are connected on each side by two slender commissures. The principal ganglia of the first group are the *cerebral* and *pharyngeal;* of the second, the *ganglia pedalia* and *visceralia*. The whole paper is so concise, and the nervous system so intricate, that the student is referred to the original, should more detailed information be required. Dr. Brandt having set at his work with the preconceived notion of the close affinities of *Chiton* and *Patella*, finished without changing his mind on the subject; but the unprejudiced student, on comparing the figures of the nervous system of *Chiton fascicularis* upon the same plate with that of *Patella*, will hardly be disposed to agree with him. Indeed, the further the embryology and minute anatomy of the two groups are carried, the more evident does their dissimilarity become.*

It is not a little astonishing that, of all the authors who have commented upon the nervous system of *Patella* as given by Cuvier, not one seems to have recognized the fact that it is not that of *Patella vulgata* at all, but (probably) that of *Patina pellucida*, an animal belonging to a different genus. Some of the discrepancies may be reconciled when the latter comes to be dissected. Neither of the species dissected by Cuvier can be recognized by anything in his article as published in the "Memoires." They are generally supposed, however, to be *vulgata* and *pellucida*. In noticing the optic nerve Dr. Brandt calls attention to the fact that the eyes are situated upon the superior surface of the base of the tentacle, and not upon a tubercle at the outer base, as usually stated, and, I may add, not upon the prominent tubercle at the inner base, as Cuvier supposed.

The digestive system has been treated by Cuvier and Lankester. The latter has added little to the labors of his predecessor, and appears not to have read his "Mémoire," or at least to have overlooked the descriptions and figures (p. 18, pl. ii, f. 7, 12) of the crop and salivary glands, as he claims them as a discovery of

* Nevertheless, the typically molluscan nature of the nervous system of *Chiton*, and the fact that it is somewhat allied to the Patellidæ, may be considered as proven by Brandt's investigations. There is room for investigation with regard to possible affinities with Brachiopoda.

his own. I would remark, by the way, that the size of the latter differs in different individuals of the same species, or perhaps in the same individual at different times. The orifice of the anus is simple, but, in most species, a number of subcylindrical papillæ or tubercles are noticeable inside of it. The latter part of the rectum in *Acmæa* is repeatedly constricted, so that the fæces are expelled in sausage-shaped pellets. The renal organ, as shown by Lankester, is double; one of the two sacs, however, is nearly abortive, and seems almost imperceptible in some species of *Collisella*. These sacs empty by two papillæ, in *Patella*, one on each side of the anal tubercle; in *Collisella* there is no papilla to the left of the anus, but a non-elevated, simple, very minute orifice, sometimes much further (to the left) from the anus than the papilla on the right side. Cuvier does not mention the left hand one in the text, but it is represented on the plate in its proper place (fig. 8, pl. 2).

I have not been able to have access to the paper of MM. Robin and Lebert, who have noticed the generative organs. Mr. Lankester gives some particulars in regard to them. The ovary has been frequently mentioned, and I have elsewhere described the male gland of *Collisella*.* The oviduct mentioned by Cuvier seems to be wanting, though I have several times thought that I detected a slender, exceedingly thin duct proceeding from the extreme left of the gland and opening into the dendritic renal sac. I cannot say that I feel sure of this, however, as the condition of the specimens was unsatisfactory, from the spirit in which they were preserved. There does not appear to be any other opening through which the young can be extruded, and I am inclined to believe that some such duct exists and will eventually be demonstrated. If the "capito-pedal orifices" exist, they must be far too small to admit of the extrusion of the young mollusk with its shell, as described by Fischer.

To the latter naturalist we owe the whole of our very slender knowledge of the development of *Patella*. He found the ovaries filled with young mollusks in the month of March, and in April the rocks and the parent shells were covered with a multitude of young Patellæ, about one millimetre in length. This disproved the idea that the eggs were deposited in a single mass, and showed that the method of extrusion rather resembled that of *Chiton*.

It is extremely desirable that the development of this animal should be observed from its early stages, and after that, it is to be hoped that some careful anatomist will give to the world an account of the anatomy, on the plan of Mr. Hancock's magnificent paper on the *Brachiopoda*. It is by no means impossible

that some of the views here brought forward may prove ill-founded; yet, if their publication incites some naturalist (more favorably situated than myself for examination of the living animal) to give to the world a thorough monograph of any species of the order, I shall not regret their refutation. In any case, I would urge most strongly on all observers the duty of doing what they can to dispel the prevalent uncertainty in regard to the questions alluded to, which have too long demanded investigation, yet failed to obtain it.

PATELLA PENTAGONA, (Born.), Rve. Plate 15 fig. 22.

*Patella pentagona*, (Born. Mus. t. Vindobonensis, pl. 15, f. 4, 5). Rve. Conch. Icon. pl. xx, f. 48, a, b, c, 1854.
*Patella stellæformis*, Rve., Conch. Systematica.
*Patella cretacea*, Rve., Conch. Icon. pl. xxi, f. 53, a, b.
*Patella tramoserica*, A. Adams, (? Chemn., not of authors), Annals Nat. Hist., ii, 1868, p. 369.
*Patella paumotensis*, Gld., Proc. B. S. N. H. ii, p. 150, 1846. Expedition Shells, 8, Moll. U. S. Ex. Ex. p. 339, fig. 440-*a* to *e*.

Animal with the foot gamboge yellow, remainder of the body pale yellow; muzzle reddish; cirri of the mantle opaque white.* Foot large; mantle margin narrow, cirri disposed in twenty-four clusters of five each, two short ones arising from the margin, two rather longer from the inner mantle-edge, and between these a fifth twice as large as the others. Head slender, produced. Branchiæ smaller in front, but not interrupted; tentacles moderate, slender. Anal, infra-anal and renal orifices well defined, small, short, but prominent. Formula, $\frac{0}{3(\frac{1}{4}\ \ 2\cdot 2\ \ \frac{1}{4})3}$.

*Hab.* Society Islands, Garrett. Paumotu Islands, Tahiti, Gld.

The dentition of this species allies it with the typical patellas of the type of *P. vulgata*; the branchiæ are similar; not interrupted in front, as Mr. Couthouy says, but continuous, as they are figured in the plates of the Ex. Exp.

Genus PATINELLA.†

Shell solid, porcellanous, with an erect subcentral apex. Cordon complete, equal all around; sides of foot provided with scalloped lappets. Teeth, $\frac{0}{3(2-1\cdot 1-2)3}$. Inner uncinus plate-like, without a cusp. Second lateral the largest.

* Couthouy MSS.
† From *Patina*, a dish.

Type PATINELLA MAGELLANICA, Gmel. Plate, 15, fig. 24.

*Patella Magellanica*, Gmel., Syst. Nat. No. 52, p. 3703, 1792. Gualt. Test., pl. 9, f. E. Martini, Conch. Cab. i, pl. v, f. 40, a, b. Lam. An. s. Vert. ed. Desh. vii, p. 534, No. 26. Rve, Icon., pl. x, f. 19 a, b.

*Patella fusca*, Dillw., Cat. vol ii, p. 1047, No. 70.

*Patella deaurata*, Gmel., Syst. Nat., p. 3719, No. 142. Lam. 1819, An. s. Vert., vi, p. 330, No. 25. Ib. Ed. Desh. vii, p. 534, No. 25. Martini Conch. Cab. x, p. 168, f. 1616. D'Orb. Voy. Am. Merid. v, p. 480, No. 44. Gould, Expl. Exp. Moll., p. 341, f. 444, 444 a.

*Patella ferruginea*, Wood, Ind. Test., No. 32. Hanley's Ed., p. 186, No. 32, pl. 37.

Soft parts. Foot nearly circular, dark slate color, with a row of leaf-like scalloped lappets all around, except below the head, integument soft and spongy; mantle yellowish, with irregularities and patches of color corresponding to the ribs and rays of the shell margin, fringed with stout, cylindrical, pointed beards or cirri, rather irregularly disposed in two rows, upon the thickened portion; they are purple at the base and yellowish at the tips. Head small, rosy-white above, whitish on neck and muzzle; tentacles long, (quite short in alcohol,) tapering, curved, rather bluntly pointed, yellowish white, with a purple stripe above, and rather swelled at the bases; eyes small on upper part of bases; branchiæ lamellæ produced, close-set, rather smaller on the anterior portion, but not interrupted in front; hood short. Muzzle small, short, transversely oval; mouth ditto; disk bordered with a double row of slender cylindrical papillæ, radiately striate, without a frill, indented below. Renal papilla subcylindrical, distinct, not sessile on the anal, which is larger, with slender subcylindrical papillæ projecting from the orifice. Infra-anal tubercle to the right, prominent, distinct, smaller than the anal. Formula, $\frac{0}{3(1+\frac{1}{2}-1\cdot1-\frac{1}{2}+1)3}$.

Gould unites *deaurata* and *Magellanica* as varieties of one species under the former name; but if, as seems probable, the two are identical, the latter name should be used, as it precedes *deaurata*, both in the Syst. Nat. and the Conchylien Cabinet, in both text and plates. The latter work, however, not being binomial, should not be quoted as an authority for specific names. *Patella ferruginea*, Wood, according to Hanley, is identical with *deaurata*, and also *P. fusca*, Dillwyn, but not the *fusca* of Gmelin. Gould separates *ferruginea*, however, as a distinct species by the animal. This genus differs essentially from *Patella*, as typified by *P. vulgata*, in anatomy, external characters and dentition.

It is not improbable that a large number of tropical species will eventually be referred to it, when their soft parts shall have been examined. Pending such an examination, it is not worth while to so refer any species which have not been dissected, even provisionally. I suspect, however, that *P. granularis* and some allied forms will be found to agree more nearly with *Patinella* than with *Patella*, as restricted.

PATINELLA, sp. indet. Plate 15, fig. 25.

Mantle bordered with two rows of fleshy elongated papillæ. Foot with a scalloped flounce or frill extending all around except under the head. Muzzle short, broad; disk fringed with beautifully arborescent papillæ; indented below.

Anus prominent, stellate with five rays, richly papillose inside; renal and infra-anal papillæ small, inconspicuous, close to anal.

A specimen of a very large *Patinella*, without any shell or number by which the species might be identified, was found in the bottle with known Magellan species. It afforded a second opportunity of figuring the dentition of this genus, and was noteworthy in the particulars just mentioned.

Genus NACELLA, Schum.

*Nacella*, Schum., Essai d'un Nouv. Syst. 1817, p. 179. Gray, P. Z. S. 1847, p. 165: in Patellidæ. Ibid., Guide Moll. 1857, p. 169; in Tecturidæ.

< *Nacella*, Chenu, Man. de Conchyl. i, p. 378. Woodw., Man. p. 155. Ad., Gen. Rec. Moll. i, p. 467; in Patellidæ. Cpr., Lect. 1860, p. 70. Second. ed. p. 72.

Shell with the apex submarginal, anterior; pellucid, thin or corneous; animal with the cordon complete before and behind, the laminæ persistent but diminishing in size before the head. Sides of the foot provided with scalloped lappets. Teeth, $\frac{0}{3(2-1\cdot1-2)3}$. Second and third laterals large, subequal.

Notwithstanding the manner in which Gray has treated this genus, which would lead, by implication, to the belief that he had not only examined the external parts of the animal, but also the dentition, the weight of evidence is too great to be disregarded, and I believe Deshayes to be correct in identifying the type *Nacella mytiloides* of Schumacher with *P. cymbularia* of Lamarck, which becomes a synonym of *mytilina*, Gmelin.

Type NACELLA MYTILINA, Gmel. sp. Plate 16, fig. 26.

*Patella mytilina*, Gmelin, Syst. Nat. 1792, vol. i, part vi, p. 3698, No. 28. (Favart d'Herbigny, Dictionnaire

d'h. Nat. Test. 2, p. 238, 239, Paris, 1775; Martini, in Neueste Mannigfaltigkeiten, Berlin, 1778, p. 417, t. 2, f. 13, 14; Helbling, Abh. einer Privatges, in Böhmen, vol. iv, p. 104, t. 1, fig. 5, 6: 1780, Prag. *fide* Gmelin, op. cit.)

*Patella mytilina*, Schub. and Wagn., Sup. Martini, pl. 229, f. 4052, 4053, Nürnberg, 1829. Desh. Ed. An. s. Vert. 1836, p. 541, No. 45.

*Patella conchacea*, Gmelin, Syst. Nat. 1792, vol. 1, part vi, p. 3708, No. 86. (Martini, in Nueste Mannigf. p. 417, t. 2, f. 13, 14, Berlin, 1778; *fide* Gmelin).

*Patella conchacea*, Bosc., Cours Compl. d'Hist. Nat. Paris, iii, p. 206, 1800. Leuckart, Isis, xvi, Col. 719, No. 3, 1825. Schum., Essai, p. 179. Schröt., Einl. p. 482, No. 100.

*Nacella mytiloides*, Schum., Essai, p. 179, pl. xxi, f. 3. Leuckhart, Isis, xvi, 1825, Col. 719, No. 3. Gray, Guide, p. 169.

*Patella mytiloides*, Desh., An. s. Vert. vii, p. 541, No. 45, 1836.

*Patella cymbularia*, Lam., An. s. Vert. vi, p. 335, No. 45, 1819. Ed. Desh., 1836, vii, p. 541, No. 45. Blainv., Mal. pl. xlix, f. 6. Chenu, Man. de Conchyl. i, p. 378, f. 2846. Gld., Moll, U. S. Expl. Exp. p. 341.

*Patella cymbuloides*, Gld., *op. cit.* in syn. (as of D'Orb.) erroneously.

*Nacella cymbalaria*, H. and A. Ad., Gen. Rec. Moll. i, p. 467, pl. lii, f. 10 a.

Soft parts: foot regularly oval, rather broader before, pale slate color on the sole, yellowish near the edges, finely granulated. Mantle edge thick, smooth, purplish, furnished with three rows of retractile filaments, arranged in quincunx order in relation to each other, the inner row the largest; one of these filaments, at the extreme posterior end of the animal, seemed considerably larger than the rest, like a tail. The larger cirri are tinged with purple at the base, the remainder yellowish. Branchial lamellæ small, yellowish, very fine and close set, diminishing anteriorly, and very small in front of the head, but not interrupted. Hood large, much prolonged, thin, very varicose. Head small, pale brown. Muzzle very long, almost proboscidiform; edge papillose, disk radiately granulose, destitute of any frill or lappets; mouth subcircular, entire; buccal lips double on each side. Tentacles moderately long, stout and bluntly pointed, pale brown. Renal papilla rounded, conical,

small close to anal, aperture minute; anal do., larger, furnished with papillæ inside the orifice; infra-anal do., smaller at the extreme right. Eyes small, on external base of tentacles. A puckered frill exists on the sides of the foot, extending all around except under the head. Formula, $\frac{0}{3(\frac{2}{2}-\frac{1}{2}\cdot\frac{1}{2}-\frac{2}{2})3}$.

Lives on floating fuci near Cape Horn.

This remarkable species was early known to naturalists, although its range appears to be comparatively limited; as far as we know, it is confined to the shores of Tierra del Fuego and the Straits of Magellan, where it finds a congenial home among the giant sea weeds for which that coast is noted. It is the analogue of *Patina pellucida* of Britain, but the arrangement of the teeth and branchiæ being quite different, they cannot even be placed in one genus.

This species, described by Gmelin under the name of *Patella mytilina* in one part of the Syst. Nat., is further on described again under the name of *P. conchacea*, with the identical references to Martini's paper which he had used in the first instance. Lamarck afterward gave it the name of *cymbularia*, by which it is best known; while Schumacher's name, *mytiloides*, though given before that of Lamarck, has been frequently quoted as a synonym of the latter. The references given by Gmelin are all to non-binomial authors, and the name *mytilina*, having ten pages precedence of *conchacea*, has been here adopted. I have been unable to discover the name *cymbuloides* in D'Orbigny's work, which Gould quotes as a synonym. No other species is at present known, and the forms from the west coast of North America which have been called "*Nacella*" will be distributed in different groups, but probably most of them will find a place in *Collisella*.

The colors are from Couthouy's notes, taken from the living animal, the anatomical details from specimens collected by him.

### Genus HELCION, Montfort.

*Helcion*, Montf., Conch. Syst. 1810, ii, p. 62. Blainv., Malac. 1825, p. 499. H. and A. Ad., Gen. Rec. Moll. i, p. 460, ii, p. 657, 1854. Gray, Guide, p. 176. P. Z. S. 1847, p. 168. Cpr., Lect. Second. Ed. p. 72.

< *Helcion*, Chenu, Man. de Conchyl. i, p. 375. (?) Meek, Check List Cret. Inv. U. S. p. 17, 1864.

*Patelloidea* sp., Cantraine, Bull. Ac. Sci. Brux. 1835.

*Helcium*, Meek and Hayden, Am. Journ. Sci. and Arts, vol. xxix, second series, p. 83 (? err. typog.)

Not *Helcion*, Stoliczka, Pal. Indica, ii, p. 323; Pictet, Mat. Pal. Suisse, 3me ser. p. 717; nor D'Orb., Voy. Am. Mer. v, p. 703; nor Jeffreys, Brit. Conch. iii, p. 242.

"Shell ovate, radiately ribbed (pectinated); apex submarginal, anterior: aperture ovate; edge crenated. Gill interrupted over the head, of small and filiform strands." Gray, Guide, p. 176.

Type HELCION PECTINATUS, Lin.

Gmelin, Syst. Nat. i, part vi, p. 3710, No. 93.

*Habitat.* Mediterranean.

The shell of this unique and typical species is distinguished by its pectinated ribs and a "peculiar glazed deposit" on the interior of the aperture (Ad., *op. cit.*) The animal has not been examined thoroughly, and nothing is known of its dentition. Until further information is brought forward it can hardly be united with the genus *Patina*, as has been done by Jeffreys.*

HELCIONISCUS, nom. subg. prov.

Shell solid, heavy, moderately elevated, with a subcentral inconspicuous apex. Cordon interrupted in front, ending abruptly on each side, at the anterior ends of the adductor. Sides of foot and mantle edge smooth. Teeth $\frac{0}{3(2-1.1-2)3}$. The inner uncinus hardly raised above the level of the ribbon, and second lateral largest, as in *Patinella*.

Type HELCIONISCUS VARIEGATUS, Dall. ex Rve. Plate 16, fig. 27.

*Patella varieyata*, Rve. Conch. Syst. ii, pl. 136, f. 1. Conch. Icon. pl. xvi, fig. 36, a, b, c. (*Hab.* Australia, in error?) Savigny, Egypt, pl. 1, f. 3. Fischer, Journ. de Conchyl. x, April, 1870, p. 167, No. 42. (Suez.)

Soft parts; foot large, oval, thin, sole lead-colored, sides smooth, yellowish; mantle dotted with brown and with brown

* Stoliczka (Pal. Indica, ii, p. 321) proposes to arrange the fossil limpets under *Helcion*, *Nacella*, *Tectura* and *Patella*, according to the external characters of the shell. As it is absolutely impossible to determine the true affinities of these remains, from the characters preserved in a fossil state, such a plan is doubtfully expedient, as it implies a knowledge which is not attainable. It would be preferable, perhaps, to refer all the fossil forms to *Patella*, with a query, rather than to give names implying the existence of characters which can never be determined. Paleontology, in a great measure, does not admit the prosecution of the only satisfactory methods of zoological research, and hence must ever remain far behind them.

maculæ on the upper edge corresponding to the rays of the shell, edge somewhat irregular, resembling the shell margin, apparently quite smooth, and destitute of beards or filaments. Branchial lamellæ large, not crowded, large and small alternately, terminating anteriorly on each side close to the end of the adductors. Hood smooth, thin, very varicose, as is the thin inner part of the mantle. Head prominent, tentacles short, pointed, slender, bases somewhat swollen, with the eyes on the upper posterior portions. Muzzle short, transversely oval, without a frill, disk slightly granulose, especially at the edges, mouth large, rounded, buccal lips conspicuous; jaw thin, pale yellow, edge somewhat irregular from use; anal and infra-anal papillæ close together on the right-hand side, long, slender, cylindrical; anal orifice simple, not papillose internally, infra-anal bifid at tip, renal smaller than the others on the left side of anal papilla. Intestine full of red matter, probably from corallines; fæces expelled in cylindrical pellets. Crop moderate, a third as long as the body. No "capito-pedal" orifices to be detected internally, externally, or by injections. Radula coiled near the buccal mass, on the inferior surface of the liver. Formula, $\frac{0}{31.\ 1\frac{1}{2}-1\cdot1-1\frac{1}{2}\ 13}$.

*Locality.* Red Sea and Gulf of Akaba, Smithsonian Cabinet.

The peculiarities of the shell of *Helcion* render it probable that it differs generically from the group under consideration, although the branchiæ exhibit points of resemblance, and I am inclined to believe that such of the species, now included under *Scutellina*, as cannot be affiliated with the *Acmæidæ*, may find a resting-place in the genus *Helcion*.

The *Helcionisci* are tropical forms most nearly allied to *Patinella*.

HELCIONISCUS ROTA, Rve. Plate 16, fig. 28.

*Patella rota*, Chemn. Conchyl., Cab. x, p. 330, pl. 168, fig. 1619. Rve Conch. Icon., pl. xvii, 39 a, b, c. ? = *H. variegata*, Rve., *ante*.

Animal in every respect resembling the last. The teeth, which are figured in a slightly different position from those of *H. variegatus*, Rve., do not exhibit any differences of value. I am inclined to think that they may be identical, in which case, the species will take the name of *H. rota*, which has priority over *variegatus*. The species before me is undoubtedly the former.

*Hab.* Madagascar, Caleb Cooke.

HELCIONISCUS (?) ARGENTATUS, Gray, sp.

*Patella argentata*, Gray, Moll. Beechey's Voyage, p. 148, pl. 39, f. 7. Gould, Expl. Exp. Moll., p. 345, pl. 29, f. 451.

Nothing is said about the extent of the branchiæ in the diagnosis, but they appear by the figure to be interrupted behind the head.

HELCIONISCUS EXARATUS, Nutt. Plate 16, fig. 29.

*Patella exarata*, Nutt., Jay's Cat., p. 38. Rve. Conch. Icon. pl. xix, fig. 47, a, b, 1854.
*Patella sandwicensis*, Pse., P. Z. S., 1860, p. 437.
*Patella undato-lirata*, Pse., ubi? MSS. label, Cab. S. I.

Mantle margin broad, thick, strongly crenate, conspicuously papillose. Sides of foot smooth, blackish. Tentacles stout, rather long; muzzle papillose around the edges. Head small, short. Branchiæ interrupted between the muscles in front, close, prominent. Foot stout and muscular. General coloration dusky, lighter in the commissures. Anal and other papillæ short but prominent. Inferior nuchal commissure deep and straight. Formula, $\frac{0}{3(2-1\cdot1-2)3}$.

*Hab.* Sandwich Islands, Pease, Garrett.

The so-called species of Mr. Pease are not even distinguishable varieties, and have no characters by which they can be differentiated from the typical *exarata*. The description of the first is in English, without a figure. I have not been able to find a description of the second.

Genus PATINA, Leach.

*Patina*, Leach, MSS, 1819. Gray, Syn. Brit. Mus., 1840. Moll. Gt. Brit., 1852, p. 223. Guide, Moll., p. 175. Syn. Brit. Mus., Ed., 1842, p. 90.
*Patella*, Loven, Ofv. K. Vet. Ak. For., 1847, p. 198.
< *Nacella*, H. & A. Ad. i, p. 467, 1854. Chenu, Man. de Conchyl., i, p. 378. Woodw. Man., p. 155. Cpr. Lect. Moll., p. 72.
*Helcion*, Jeffreys, Brit. Conch., iii, p, 242. (Not Montfort.)
*Ansates*, Sby., Conch. Man. Ed. ii, p. 68, 1842. (Not Klein.)
*? Goniclis*, Raf. (See Syn. *Patella.*)

Animal with the branchial cordon interrupted in front; teeth with the inner two series parallel, third series with a larger denticulate cusp, posterior; radula furnished with three uncini on each side. Formula, $\frac{0}{3(\frac{1}{3}-2\cdot2-\frac{1}{3})3}$. Shell with the apex subterminal, anterior; smooth, thin, semi-pellucid or horny in texture.

Should the details of the soft parts and dentition of *Helcion* (*pectinatus*) prove on examination to agree with those of the

type of this genus, they must be consolidated, but, pending such an examination, in view of the considerable conchological differences which exist, this would be hardly admissible. The dentition and interrupted branchiæ separate it definitely from the genus *Nacella*, although the shells are very similar. It is not probable that any of the species of "*Nacella*" from the northwest coast are congeneric.

Type PATINA PELLUCIDA, Linn., sp. Pl. 16, fig. 30.

*Patella pellucida*, Lin., Syst. Nat. xx, 1260.
*Patella lævis*, Penn, Brit. Zool. iv, p. 144, pl. xc, fig. 151.
*Patella cærulea*, Pult., Cat. Dorset., pl. xxiii, f. 6.
*Patella bimaculata*, Mont., Test. Brit., p. 482, pl. xiii, f. 8.
*Patina lævis*, Leach, Moll. Gt. Brit., p. 224, No. 1.
*Patina pellucida*, Leach, ib., p. 224, No. 2.
*Patella cæruleata*, Da Costa, Brit. Conch. p. 7, pl. 1, f. 5, 6.
*Patella elongata*, + *elliptica*, Flem., Ency. Edin. pl. 204, fig. 2, 3.
*Patella cornea*, Pot. and Mich., Gal. Donai. Moll. p. 525, pl. xxxvii, f. 5, 6.
*Patella intorta*, Pennant, + *P. minor*, Wallace, fide Jeffreys.
*Helcion pellucidum*, Jeffreys, Brit. Conch. iii, p. 242.

Soft parts. Foot oval, sole yellowish white edged with a narrow brown line, body cream color with a tinge of brown in front; mantle often bordered with a grey or lead colored line, fringed with fine white cirri, alternately long and short; gills whitish, interrupted in front of the adductor; mouth minutely puckered, head small; tentacles slender, long; eyes small, on their outer bases. Habitat upon the stalks and fronds of large fuci, British and North European Seas.

I have not been able to obtain specimens of the soft parts, and have quoted from Jeffreys and others; the dentition is from Lovèn.

Although the shells are very similar, the animal differs strongly from that of *Nacella*. Clark makes the statement that the orifices of the anal and genital papillæ are below the right tentacle on the side of the neck, not on the side of the body as in other species, but this requires confirmation, and is probably an error. There are a number of other species which will probably find a place in this genus; they are now usually termed *Nacella*.

Genus METOPTOMA, Phillips.

*Metoptoma*, Phil., Geol. Yorksh. ii, p. 223, 1836. Leonh. and Bronn., Jahrb. p. 750, 1841. Morris, Br. foss. p. 151, 1843. Woodw., Man. p. 155. Stoliczka, Pal. Indica, ii, p. 324. Eichw., Leth. Ross. i, p. 1098.

Not *Deslongchampsia*, as per Chenu, Man. de Conchyl. i, p. 376; nor *Patella*, Ib. i, p. 375, fig. 2281.

Shell patelliform, scar horseshoe shaped; apex subcentral, shell truncate behind the apex, with the posterior margin broadly emarginate or waved, and the anterior slope the longest.

Type *M. pileus*, Phil., l. c. p. 224, pl. xiv, f. 7. Carb. lime stone, Great Britain.

This genus, characterized by the extraordinary *posterior* truncation, is only known from the older rocks in a fossil state.

Chenu wrongly places it as a synonym of *Deslongchampsia*, McCoy, (though having eighteen years priority!) with which it cannot be affiliated. His figure of *Patella solaris*, de Kon., represents a typical *Metoptoma*, but not the type of the genus, a statement I wrongly attributed to Mr. Meek, in this Journal vol. vi, p. 20. Stoliczka compares *Capulus Troscheli*, Mull., from the Aachen cretaceous beds, with *Metoptoma*, which it appears to resemble. A number of the species referred by Billings (Pal. Foss. Can. Geol. Survey) to this genus, are evidently not congeneric.

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## LIST OF FIGURES.

### Plate 14.

1. *Acmæa mitra*, Esch. Original.
2. " *virginea*, Müll. Confirmed from Lovèn's figure.
3. " *insessa*, Hinds. Original.
4. *Collisella patina*, Esch. Original.
5. " *strigatella*, Cpr. Original; a, uncinus.
6. " *pelta*, Esch. Original.
7. " *asmi*, Midd. Original; a, uncinus.
8. " *persona*, Esch. Original.
9. " *mitella*, Mke. Original.
10. " *spectrum*, Rve. Original.
11. " *fascicularis*, Mke. Original.
12. " *scabra*, Rve. Original; a, uncinus.
13. " *testudinalis*, Müll. Original.
14. " *subrugosa*, D'Orb. Original.
15. " *atrata*, Cpr. Original; a, uncinus.

## Plate 15.

16. *Colisella pediculus*, Phil. Original; a, uncinus.
17. " *Borneënsis*, Rve. Original; a, uncini.
18. " *saccharina*, Lin. Original; a, uncini.
19. *Scurria mesoleuca*, Mke. Original; a, uncinus.
20. *Lottia gigantea*, Gray. Original.
21. *Ancistromesus Mexicanus*, B. & S. Original.
22. *Patella pentagona*, Born. Original.
23. " *vulgata*, Lin. Original.
24. *Patinella magellanica*, Gmel. Original.
25. *Patinella*, sp. indet. Original.

## Plate 16.

26. *Nacella mytilina*, Gmelin.
27. *Helcioniscus variegatus*, Rve. Original.
28. " *rota*, Original.
29. " *exaratus*, Rve. Original.
30. *Patina pellucida*, Lin, after Lovèn.
31. a, muzzle of *Acmæa;* b, do. of *Collisella;* c, do. of *Patella.*
32. a, profile of teeth of *Acmæa;* b, do. of *Collisella.*
33. a, jaw of *Collisella;* b, do. of *Patinella.*

## Plate 17.

34. *Collisella sybaritica*, Dall.
35. " (*? patina* var.) *ochracea*, Dall.
36. " *pelta*, var. *nacelloides*, Dall.
37. " (*Collisella* ?) *hieroglyphica*, Dall.
38. " *Collisella Borneënsis*, Reeve.

# NOTICES AND REVIEWS

OF

# NEW CONCHOLOGICAL WORKS.

BY GEO. W. TRYON, JR.

## I.—AMERICAN.

**Synopsis of the Family Unionidæ.** By Isaac Lea, LL.D. Fourth edition, 184 pp. 4to. Phila., 1870.

The author states in his preface that during the eighteen years that have elapsed since the publication of the third edition of his "Synopsis," the number of admitted species and synonyms has been doubled, showing the great activity of students and collectors in this branch of conchology. In the introductory portion of the admirable review of the classifications of Unionidæ proposed by former authors, Dr. Lea gives the number of species included in the present volume as follows: Recent species known to him and admitted to be distinct, 1069; 224 doubtful species, including those only known through descriptions; 183 fossil species, and 891 synonyms.

Following the tables of species and synonyms, which, as in former editions, are arranged under the various genera in groups divided according to differences in form and surface, is a table of Geographical Distribution, which is a great improvement on the tables formerly given, as it gives the names of rivers and States, where formerly the divisions North and South America, Europe, etc., were deemed sufficiently particular. In this list the number of species of Unio inhabiting Europe is placed at nine, notwithstanding the industry with which European provincial naturalists have been enriching conchological science for some years by describing most of the Unionidæ of their respective neighborhoods as new! I agree with Dr. Lea in his whole-

sale reduction. In this European list is placed, by error, "*U. depressus*, Lam., North Holland," instead of New Holland, and I have noticed various other small errors of the pen and some of the press, in this magnificent work, but considering the immensity of an affair which required the author to consult *eleven hundred works* in its preparation, he may be congratulated upon having made it so nearly perfect.

The "Synopsis" will of course become a necessary aid to all collectors and students of the Unionidæ, and I hope that the author has had a sufficiently large edition prepared to enable all who desire it to procure copies. The mechanical execution and material of the volume leave nothing to be desired, being even superior in appearance to the usual luxurious style of Dr. Lea's publications.

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**Canadian Naturalist.** V, No. 1. July 30, 1870.

*Lower Canadian Land and Fresh Water Mollusca.* By J. F. WHITEAVES.

*Lower Canadian Marine Mollusca.* By the same.

Two small papers containing additions to lists formerly published in the "Naturalist." *Bythinia tentaculata* is found living in Lachine Canal, introduced from Europe probably.

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**Proceedings of the California Academy of Sciences.** IV. Part 2, 1870.

*On the Shells of Antioch, Cal., and vicinity.* By H. P. CARLTON.

*Shells of Truckee River and vicinity.* By H. P. CARLTON.

*The West Coast Fresh-water Univalves.* No. 1. By J. G. COOPER, M. D.

In this paper the author is even more conservative than in his paper on the terrestrial species, reducing many species to "varieties," and referring many species to eastern North American types, although generally recognized as distinct. It would be simply a waste of time to attempt to correct what appear to me to be the very numerous and grave errors of this paper, the author of which seems to have predetermined before studying the species, that too many had been described. Those who take a very conservative view of the subject will doubtless be well pleased with the paper, and we recommend it to their perusal.

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**Proceedings of the Academy of Natural Sciences of Philadelphia.** April, 1870

*Descriptions of Fossils collected by the U. S. Geological Survey, under the charge of Clarence King, Esq.* By F. B. MEEK.

I introduce this paper in order to call attention to some of the remarkable fresh-water species described from Idaho, namely, two species of *Carinifex*, one of which (*C. Tryoni*) is made the type of a new subgenus, *Vorticifex*,* a genus hitherto represented by a single species, *C. Newberryi*, of California; also a true *Melania* of Asiatic type.

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## II.—FOREIGN.

### BRITISH.

**Proceedings of the Zoological Society, London.** Part 2, 1869.

*Description of a New Genus and Fourteen New Species of Marine Shells.* By HENRY ADAMS.

*Conus cernicus*, Barclay MSS. Mauritius.
*Clathurella Robillardi*, Barclay MSS. Mauritius.
*Drillia Barkliensis*, H. Ad. Mauritius.
*Coralliophila coronata*, Barcl. MSS. Mauritius.
*Mauritia*, n. gen. (*Mitridæ*).
*Mauritia Barclayi*, H. Ad. Mauritius.
*Marginella mirabilis*, Barcl. MSS. Hab. ?
*Nacella cernica*, Barcl. MSS. Mauritius.
*Natica marmorata*, H. Ad. Canary Isl.
*Scala delicatula*, H. Ad. Lancerote.
*Symola minuta*, H. Ad. Orotava.
*Turbonilla speciosa*, H. Ad. Vigo.
*Cancellaria pusilla*, H. Ad. Canary Isl.
*Haminea subpellucida*, H. Ad. Lisbon.
*Gouldia modesta*, H. Ad. Gulf of Tunis.

The following names, preoccupied by other authors, are changed:

*Helix Blanfordi* to *Blanfordiana*, and *Pupina Pfeifferi* to *Pfeifferiana*. *Stylodonta rufocincta* to *S. rufozonata*, and *Nanina conulus* to *N. turritella*.

*On three New Species of Australian Marine Shells.* By J. C. COX, M. D.

*Cypræa Thatcheri*, *Voluta Harfordi*. *Voluta Selateri*.

*Descriptions of New Land and Fresh-water Molluscan Species collected by Dr. John Anderson in Upper Burma and Yunan.* By W. T. BLANFORD.

* By typographical error printed *Vortifex*.

*Paludina Bengalensis*, var. *digona* (vel *P. digona.*)
" *dissimilis*, Müll., var. *decussatula* (vel *P. decussatula.*)
*Melania Iravadica*,
*Fairbankia ?* (an *Bithynia ?*) *turrita*,
*Cyclophorus sublævigatus*,
*Spiraculum Andersoni*,
*Helix catostoma*,
" *Andersoni*,
" *percompressa*,
*Bithynia Irawadica*,
*Nanina arata*,
*Achatina obtusa*,
" *subfusiformis*,
*Succinea acuminata*,
*Unio Burmanus.*

**Part III, 1869.**

*Notes on the Localities of two Species of Land Shells and three Species of Volutes.* By JOHN BRAZIER.

*Diplommatina Martensi*, H. Ad. Isl. Avola, Fiji Is.
*Palaina Coxi*, H. Ad. Norfolk Isl.
*Aulica Rueckeri*, Crosse. Solomon Isl.
*Volutella Tissotiana*, Crosse. N. Australia.
*Alcithœ Thatcheri*, McCoy. Bampton Reef, New Caledonia.

*List of Cones found in Port Jackson, New South Wales, with Notes on their Habitats and Distribution.* By JOHN BRAZIER.

*Descriptions of eight New Species of Helicidæ from the Western Pacific Islands.* By GEO. FRENCH ANGAS.

*Helix Psyche*, Solomon Isl.
" *Adonis*, "
" *cærulescens*, "
" *deidamia*, "
*Helix Hargreavesi*, Solomon Isl.
" *Hermione*, "
" *Boydi*, "
" *Fessonia*, Fiji Isles.

*On the Classification of the Helicterinæ.* By HARPER PEASE.

*Helicter*, Fer., was described in 1821, and has eight years priority over *Achatinella*, Swains., 1828. Eleven subgenera have been described by authors, which are retained as genera and two new ones added. 388 species have been described, of which 166 are considered synonyms, leaving 222 species believed to be distinct. The species are entirely confined to the Sandwich Islands. The new genera proposed are:

*Eburnella*, type *Ach. casta*, Newcomb.
*Perdicella*, " " *Alexandri*, Newc.

The diagnosis of each genus is given, with lists of species, remarks on distribution and synonymy.

**Proceedings of the Asiatic Society of Bengal.** No. , March, 1870.

*Notes on a few species of Andamanese land shells, lately described in the American Journal of Conchology.* By Dr. F. Stoliczka.

The author corrects the assertion made by me in the paper referred to above, that the Andaman Islands are almost unknown conchologically, by showing that Messrs. Benson and Theobald have described and enumerated about twenty species. He also states that Andaman Island has a population of 8,000 foreign inhabitants, and has been for twelve years the largest Indian convict settlement. I have no excuse to offer for great negligence in preparing my paper, which I certainly would not have published had I been aware of the publication of the species, which our correspondent, Dr. Stoliczka, shows to have priority—although I would not have been able to identify them, having neither specimens nor figures to refer to, as none of the species had been previously figured.

*Helix Chambertinii*, Tryon = *H. Haughtoni*, Benson, 1863.
*Helix Bigsbyi*, Tryon = *H. trochalia*, Benson, 1861.
*Helix Andamanensis*, Tryon = *H. exul*, Theobald, 1864, = *?H. stephus*, Benson, 1861.
*Bulimus Pealei*, Tryon=*Spiraxis Haughtoni*, Benson, 1863.

Dr. Stoliczka also considers ? *Cyclostoma Leai*, nob. = *Cyclophorus foliaceus* Chemn. but to this decision I do not agree, and refer the reader to my "Note on *Cyclophorus foliaceus*, Reeve (non Chemnitz,) and *C. Leai*, Tryon," published in this Journal, vi, 25.

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**Journal of the Ceylon Branch of the Royal Asiatic Society.** 1867—1870. Part 1, Colombo, 1870.

*Description of a new Genus and five new species of Marine Univalves from the Southern Province, Ceylon.* By G. and H. Nevill.

*Robinsonia*, Nov. gen.
*R. ceylanica*,
*R. pusilla*,
*Pleurotoma (Mangelia) Boakei.*
*Pleurotoma curculis.*
*Pleurotoma lemniscata.*

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**Annals and Magazine of Natural History.** 4th Series, No. 25. London, January, 1870.

*On a new Genus of Testacellidæ in Australia.* By C. Semper.

The animal in question is *Helix inæqualis*, Pfeiffer, placed by

Albers in the group *Rhytida*, and as it has no jaw, while the dentition resembles that of *Glandina*, it belongs to the Testacellidæ rather than the Helicidæ. The author conjectures that a number of allied species will also have to be removed from the Helicidæ, when the soft parts are examined, and Conchological characters are not wanting to distinguish the group.

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**On the Specific Distinctness of Anodonta anatina.** By R. M. Lloyd.

"There has been a diversity of opinion as to whether *Anodonta anatina* is a distinct species or only a variety of *A. cygnea*."

The author has attentively studied these animals and believes them to be distinct species, pointing out differences in the soft parts. He states that when the branchial orifice in *Unio or Anodonta* "from any cause becomes covered by sand or mud and the anal one remains free, it will then draw water in through the anal opening and expel it through the branchial one, causing the sand or mud to be blown away with very great violence, after which the normal state of affairs is resumed. This action is purely mechanical, the animal relaxing the adductor muscles, the valves gape, the opening, however, which would otherwise have been formed remaining closed by the thickened edges of the mantle being kept in contact; this causes the water to enter the anal orifice; then the valves are suddenly closed, and the water ejected through the branchial opening, the whole action being, in fact, exactly that of a pair of bellows. If both orifices are covered and there is water between the valves, they are brought together and the branchial one freed, the anal one being afterwards uncovered by the ordinary action of the current."

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**No. 29.** May, 1870.

*Morphological Researches on the Mollusca.* By M. Lacaze Duthiers.

One of the most difficult types of the Mollusca to reduce to a theoretical plan is undoubtedly that of the Gasteropods. I propose to show that, by taking the relations of the organs and of the nervous system, it is always possible to refer the various forms to a single plan.

Let us reduce the body of the Gasteropod, for sake of simplicity, to four parts—the head, the foot, the visceral mass, and the mantle. If we unroll the body of a species with a turbinated shell we shall have beneath the head and below the foot a reversed cone containing the viscera.

The relations of these parts are essentially variable. Thus the head is often separated from the visceral mass by a true neck. As to the mantle its morphology is difficult.

The study of the embryo of *Ancylus* enables us with ease to recognize this organ from its origin. In fact, upon the embryonic sphere the head first betrays itself by the formation of the mouth. Soon two disks, bounded by a circular cushion, show themselves, the one near, the other opposite the mouth; the former is the foot, the latter the mantle. At this moment the *Ancylus* represents the ideal being with the four principal parts.

Starting from this state, we may vary the forms and explain the modifications of the Gasteropod type. But in the first place, to have an exact idea of the mantle, let us suppose the embryonal disk from which it is derived eminently elastic and extensible; let us assume, further, a traction exserted upon its centre and directed backwards, and we shall obtain a reversed cone, of which the apex will be the point of application of the force of traction, and the base the part of the body bounded by the circular cushion of the primitive disk. The intestines will penetrate by traction into the cone thus formed; but the foot and head will remain without. These four parts will be deformed, but their relations will remain constant.

It is easy to account for some forms which are very different in appearance. For example, in the Limaces the foot increases sufficiently below to lodge the viscera, and the mantle forms nothing more than a little disk or buckler; in the Testacellæ and the Bulbeæ the foot follows the neck in its excessive development, and the mantle remains rudimentary at the end of the body; in the Aplysiæ the foot and the neck become much developed upward, but the foot still increases sufficiently in its lower part to cover with its two lobes the back and even the mantle, with which it has been erroneously confounded.

The criterion which I propose enables us to determine the homologous parts.

Four groups of nervous ganglia characterize the Mollusca in general and the Gasteropoda in particular. These are, first, the stomato-gastric, the cerebroid, and the pedal ganglia. The fourth group, intermediate between the latter two, always placed a little behind and below the pedal centre, is unsymmetrical—that is to say, formed by an uneven number of ganglia, generally five. It characterizes the Gasteropod group, and, except the head, the foot, and the viscera, it innervates all the organs. The name which would designate its relation would be that of branchia cardio-pallio-genital; but I shall simply call it the median or inferior centre. It varies much; sometimes it forms a very small ring, sometimes an extremely long curve which seems to modify and change all other relations. Thus in the Limnææ, the Planorbes, and the Ancyli, although its ganglia are a little

disjointed, it is very close to the other centres. Again, in the Helices, the Testacellæ, the Limaces, etc., its five ganglia lie upon the pedal centre, and are united to it in such a manner by a common conjunction tissue, that they have been described as the posterior pedal ganglia.

In the Aplysiæ, the Bullcæ, all the Pectinibranchia, and the Cyclostomata, the commissure which unites the inferior ganglia is long and twisted, and the homologous parts are difficult to recognize. Notwithstanding this, the general connections remain constantly fixed.

With regard to the mantle, the following facts leave no doubt. By numerous dissections of the most different types, I believe I am able to establish that this part of the body is exclusively innervated by the inferior centre, and that henceforward we may define it thus:—Any fold or cutaneous part of the body of the Gasteropod receiving nerves from the inferior or unsymmetrical centre, is either the mantle or a dependence of the mantle. The forms of the pallial fold may vary infinitely, their connections never. How, therefore, can we, in Aplysiæ, regard the two large lobes which ascend at the back and at each side expose its back as being dependencies of the mantle, when their nerves all come from the pedal ganglia? These lobes are the foot itself, and serve for swimming.

The dorsal shield of the Limaces is the mantle very slightly developed; it receives all its nerves from the inferior centre; and the part which is drawn out along the lower part of the body and contains the viscera, is the foot, for its nerves are derived from the anterior centre. Again, in the Testacellæ, it is the upper part of the neck and of the foot which becomes developed and lodges the organs. The connections of the nerves show the mantle reduced to that inferior part which covers the shell.

These examples suffice to prove the utility of the principle, which will lead us to a single scheme, the true theoretical and the ideal archetype of the Gasteropod.—*Comptes Rendus*, December, 27, 1869, tome lxix, p. 1344.

*A new British Land Shell.* By J. Gwyn Jeffreys.

*Helix glabra*, Studer, a continental species, is now first recorded as British.

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**Observations on the Geology and Zoology of Abyssinia.** By W. T. Blanford. 8vo. London, 1870.

Contains: 1. A list of Oceanic Mollusca obtained off the S. E. coast of Arabia. 2. Marine Mollusca from Annesley Bay. 3.

Freshwater Mollusca. 4. Land Mollusca. Of the land Mollusca, Mr. Blanford states that, "but a very meagre series was obtained, the country being evidently excessively poor in land-shells. No Cyclostomacea have ever been found in this part of Africa, and the large Achatinæ and their allies were entirely wanting in the country traversed, although they appear to have been found further to the southwest, near Lake Dembea.

No new species are described.

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**Transactions of the Royal Irish Academy.** Vol. XXIV. Part XI Dublin, 1869.

*On the Histology of the Test of the Class Palliobranchiata.* By Prof. W. KING.

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**Conchologia Iconica.** Parts 282, 283. London, 1870.

ANODON. *Plates* 25—37. *Completing the monograph.*

The following are described as new:

*A. tricostatus, Sowerby. China.*
*A. Rio Platensis, Sowerby. Rio de la Plata.*

As *A. alatus*, Lea, is figured and described the *Spatha alata* of Lake Nyassa. The difference between *A. imbecillis* Lea and *A. incertus* Say are carefully pointed out, but the two species are identical nevertheless.

Species 103, *A. Burroughianus*, Lea, from Isl. Luconia near Manilla, has a curious synonymy, namely, *A. oblitus*, Lea, from East Tenn. and a *A. kennicotti*? Lea, from Great Slave Lake!

Sp. 106, *A. pholadiformis*, Sowerby, N. Sp. from Montreal. I do not think this is distinct from *A. irisans*, Anth., published in this Journal, vol. 1.

Sp. 107, *A. subgibbosus*, Anthony "MSS." Published in this Journal, vol. 2, 144, 1866.

Sp. 110, *A. quadriplicatus*, Sowerby, Nov. Sp. Potomac River, is not even an Anodonta; it is known in this vicinity under the name of *Margaritana undulata*, Say, is one of the commonest and best known of American species, and has been figured by Sowerby already under the latter specific name.

Sp. 112, *A. Williamsii*, Lea. It is possible that this is a strangely formed young shell of that species, for the figure is of that convenient style of execution that will allow of a reference to almost any species. It is not half the size of an adult *Williamsii* and its beaks are much too prominent. The river Potomac is not in Georgia, as stated by Sowerby.

*Anodon triangularis*, Lea, Sp. 56, is a *Margaritana.*

Sp. 115, *A. ciconia*, Gould, the two figures represent different species, the upper one being correct. Even the comprehensive locality "United States" will not cover this species, which is Mexican, but scarcely a synonym of *A. trapezialis*, Lam., as supposed by Dr. Lea in the new edition of his Synopsis.

Sp. 122, *A. Cumingii*, Lea, is a *Monocondylœa.*

Sp. 124, *A. brevis*, Sowb., Nov. Sp. Rio de la Plata.

Sp. 135, *A. cochlearis*, Sowb., Nov. Sp. Hab—?

Sp. 137, *A. Schomburgianus*, Sowb., Nov. Sp. Brit. Guiana.

Sp. 138, *A. virens*, Lea. Two localities are given—"River Euphrates," which is incorrect, and "Red River, Alexandria." Which Alexandria is meant is not stated, but if "Louisiana" be added, the latter locality will be correct. I suspect that an Egyptian habitat was intended by Sowerby.

Sp. 140, *A. Henryana*, Lea, correct locality from Tamanlipas to Tamaulipas, Mexico.

Sp. 150, *A. Pepinianus*, we are informed is found in "Lake Pepin, County Ohio."

Sp. 152, *A. giganteus*, Lea. The shell previously figured (sp. 18) under this name, is *A. trapezialis*, Lam.

I here take leave of Sowerby's Unionidæ, I trust forever. The series of monographs composing it certainly contain more errors than any other work on Natural History that I have ever seen.

SCUTUS. 2 *plates. Complete.*

TUGALIA. 1 *plate. Complete.*

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FRENCH.

**Journal de Conchyliologie.** Paris, July, 1870. 87 pp. with 1 colored and two uncolored plates.

*Note sur quelques espèces du genre Doris décrites par Cuvier.* By P. FISCHER.

*Habitat parasitaire des Mollusques—Mollusques parasites des Holothuries.* By DR. A. MANZONI.

*Diagnoses Molluscorum novorum, reipublicæ Mexicanæ et Guatemalæ incolorum.* By H. CROSSE and P. FISCHER.

*Limax Guatemalensis,* *Zonites Tehuantepecensis.*

*Description de trois espèces nouvelles d'Helix d'Espagne.* By Dr. J. G. Hidalgo.

*Helix Montserratensis,* *Helix Zapateri.*
*Helix semipicta.*

*Diagnoses Molluscorum Novæ-Caledoniæ incolarum.* By H. Crosse.

*Scaliola Caledonica,* *Helix multisulcata.*

*Description d'espèces nouvelles de Coquilles marines des côtes d'Australie.* By John Brazier.

*Conus Cooki,* *Conus Rossiteri.*

*Diagnoses Molluscorum novorum.* By H. Crosse.

*Bulimus Kuhnholtzianus.* Montevideo.
*Purpura porphyroleuca.* Tahiti.
*Trophon Petterdi.* Tasmania.
*Fossarina Petterdi.* Brazier MSS. Tasmania.
*Marginella Angasi.* " " "

*Description d'espèces nouvelles provenant de l'ile Maurice.* By E. Lienard.

*Conus Julii,* *Leptoconchus Robillardi.*

*Note sur le Physa capillata, de l'ile de Crète.* By J. B. Gassies.

*Physa capillata.*

*Note sur une espèce nouvelle d'Avellana du lias superieur.* By E. Dumortier.

*Descriptions d'espèces nouvelles du bassin de Paris.* By Dr. A. Bezancon.

*Description de Coquilles fossiles des terrains tertiaires inférieurs* (continued.) By M. C. Mayer.

*Catalogue des Mollusques fossiles des Marnes bleues de Blot près Antibes* (*Alpes-Maritimes.*) By Alfred Bell.

*Description de plusieurs espèces fossiles d'Auriculacés des terrains tertiaires supérieurs.* By M. R. Tournouer.

*Bibliographie.*

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**Revue et Magasin de Zoologie.** Conducted by Guerin-Méneville. No. 3. 1870.

*Mollusques nouveaux, litigieux ou peu connus.* By M. J. R. Bourguignat. Continued.

| | | | |
|---|---|---|---|
| *Zonites catoleius.* | Egypt. | *Z. Courquini.* | Barcelona. |
| " *Durandoianus.* | Algiers. | " *Jaccetanicus.* | " |
| " *pictonicus.* | France. | *Helix Laurenti.* | Almeria. |

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**Notes Malacologiques.** By Dr. A. Senoner. (Translated from the Italian by Arm. Thielens. 8vo, 6 pp. Bruxelles, 1870.

This paper contains nothing but extracts from Prof. Strobel's contribution to the "Acts" of the Natural History Society of Milan. Vol. xi, 1868, describing *Helix Cuyana* and *Vaginulus Bonariensis* from Buenos Ayres.

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**Annals des Sciences Naturelles.** 5th Series, Zoologie. Vol. XI. Nos. 1–4.

*Observations sur la fécondation des mollusques cephalopodes du golfe de Gascogne.* By M. A. Lafont.

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GERMAN.

**Verhandlungen der Kaiserlich-Koniglichen Zoologisch-botanischen Gesselschaft in Wien.** XIX. Vienna, 1869.

*Beitrage zur Fauna der Nicobaren.* By Georg Ritter von Frauenfeld. Part 3d. Mollusca.

The geographical distribution of the species inhabiting the Nicobar Islands is carefully tabulated, to which is added copious notes on many of the species.

*Nachlese zu Tirol's Land-und Susswasser Conchylien.* By Vinc. Gredler.

This is an appendix to the author's papers on the Mollusca of Tirol, published in the "Verhandlungen" for 1856—1859.

*Pupa Tirolensis*, nov. spec.

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**Systematisches Verzeichniss der in Deutschland Lebenden Binnen-Mollusken.** By Carl Kreglinger. 8vo, 400 pp. Wiesbaden, 1870.

This is a very complete account, apparently, of the land and fresh-water mollusca of Germany, prefaced by a very full list of authors cited. The bibliography of the three hundred and forty-seven species is very full, and copious remarks are made on localities and station both in and out of Germany. At the end of the book is a table of distribution, dividing Germany into seven zoological provinces.

The work is careful and thorough, and will rank with Wein-

kauff's Mediterranean Mollusca, as one of the best of the many useful works on Conchology produced during the past decade. The book may be imported through any bookseller for about ten dollars currency, and it should be in the library of every Conchologist possessing an European collection.

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**Archiv fur Naturgeschichte**. Conducted by Dr. F. H. Troschel. 35th year. 3d part. Berlin. 1869.

The editor commences in this number his annual review of the conchological literature of the year 1868.

36th year, part 1st. Berlin, 1870.

*Ueber den hydrostatischen Apparat des Nautilus Pompilius.* By Dr. Wilhelm Meigen.

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**Bulletin de la Societie Imperiale des Naturalitistes de Moscou.** No 1, 1869.

*Ueber das Geruchsorgan der Cephalopoden.* By Dr. D. Zernoff, (with two plates).

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**Systematisches Conchylien-Cabinet von Martini und Chemnitz.** Continued by H. C. Küster, etc. Part 195. Nurnberg. 1869.

The text and five colored plates continue the monograph of Veneridæ.

196th part. Nürnberg. 1869.

The text continues Küster's Monograph of *Murex*, and the plates illustrate *Murex* and *Ranella*.

*Murex angistoma*, nov. sp. Loc.—?
" *semiclausus*, nov. sp. Loc.—?
" *pumilus*, nov. sp. Loc.—?

197th part. Nürnberg. 1870.

This number contains the continuation of the Monograph of *Donax*, with the following new species:

*D. siliqua*, Römer. Locality unknown.

198th part. Nürnberg, 1870.

Contains continuation of the Monograph of *Donax*, with four colored plates.

*Donax lepidus*, Römer. Loc.—?

There is also a continuation of the text of the monograph of Venus.

**Novitates Conchologicæ.** Land Conchylien. By Louis Pfeiffer. Part 36, completing Vol. 3 ; with 3 colored plates. Cassel. 1869.

The plates illustrates *Helices* and *Bulimi*, principally Indian and Polynesian.

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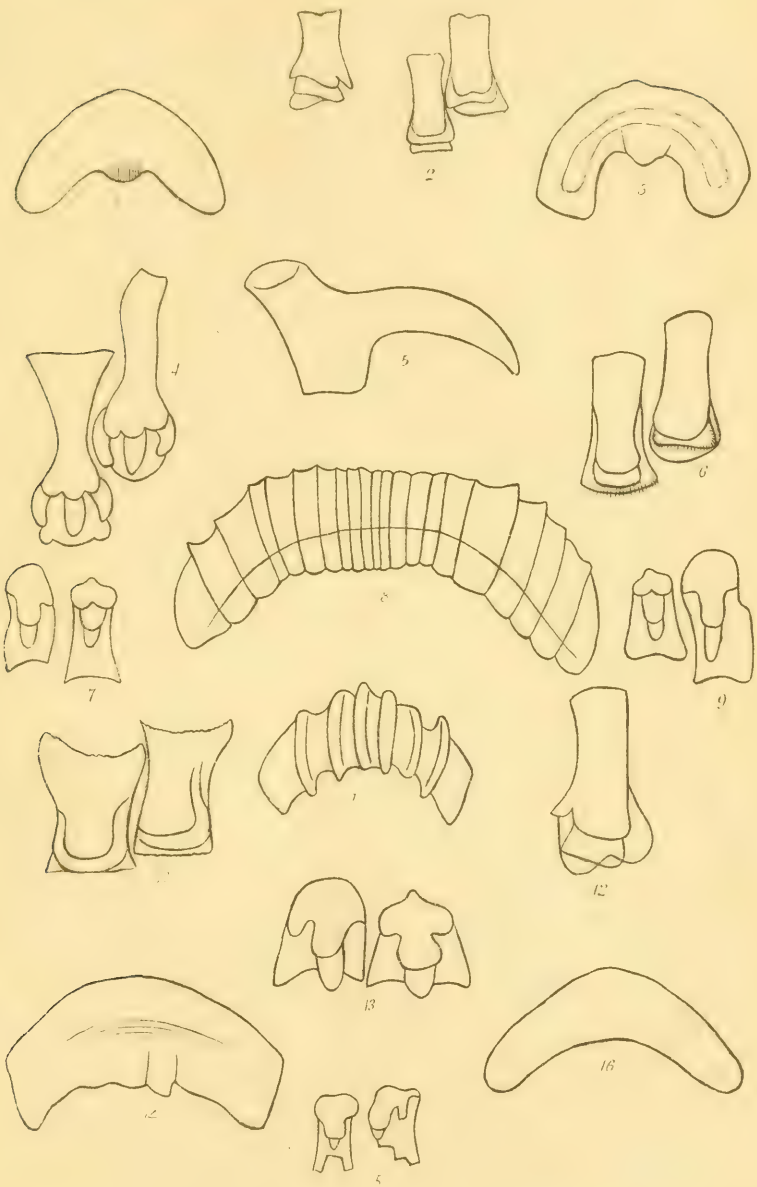
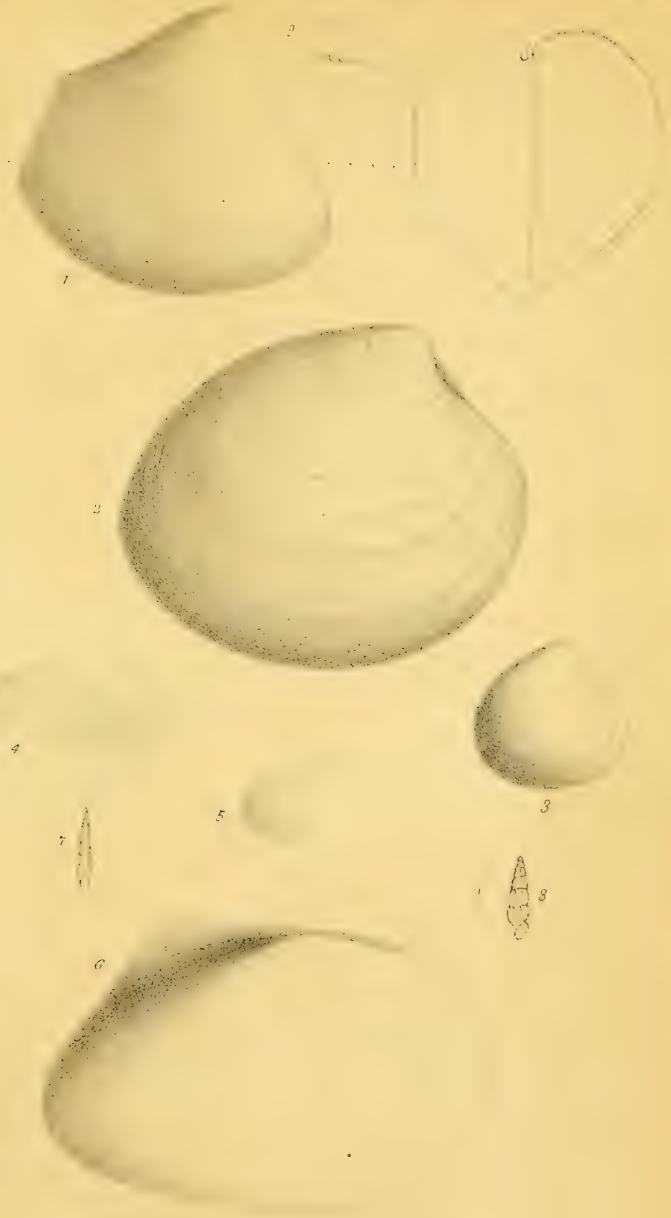
**Novitates Conchologicæ.** Supplement III. Monographie der Mollusken-gattung Venus, Linne. By Dr. Edw. Römer. 22d, 23d parts, with six colored plates.

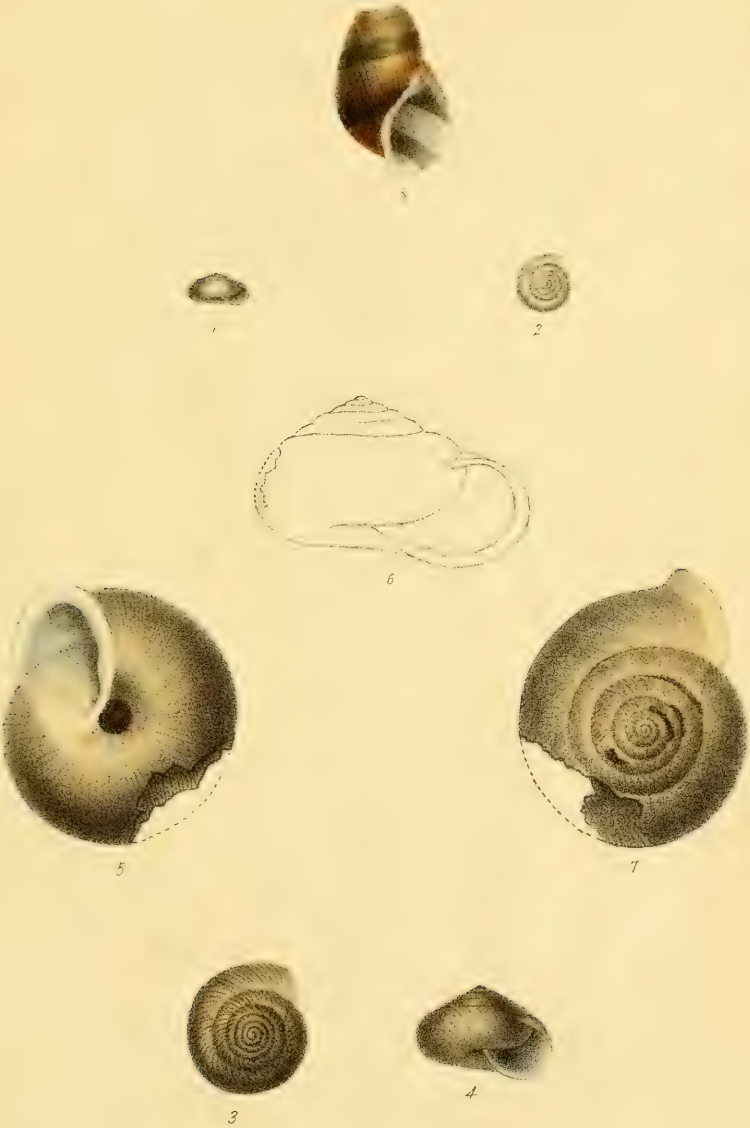
Contains monography of *Sunetta.*



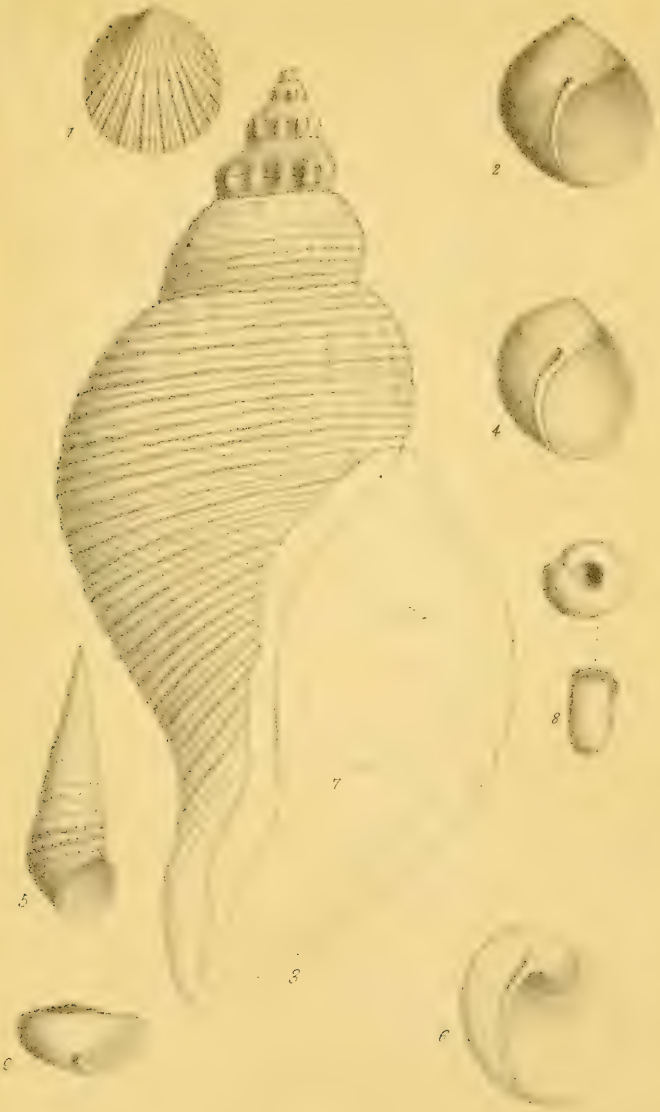
Binney & Bland, On Lingual Dentition of Mollusca.



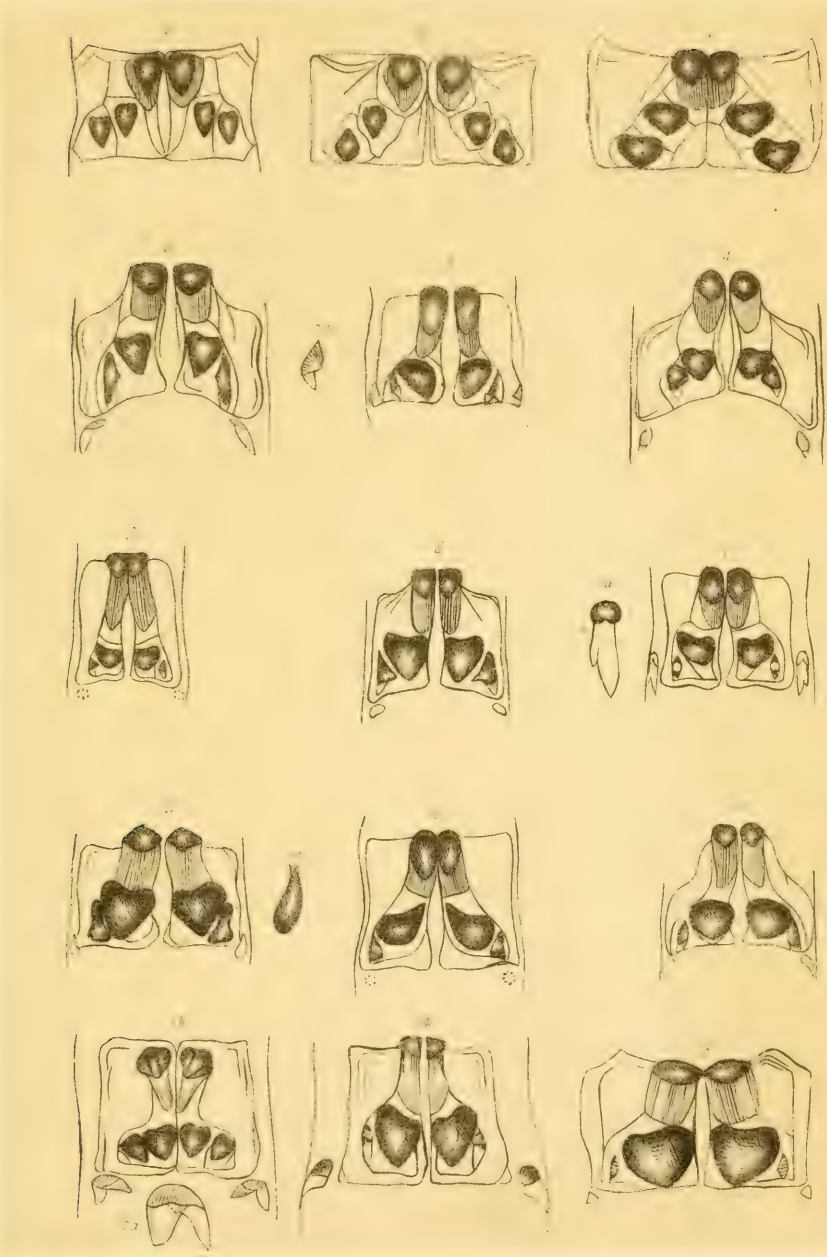

Conrad, Fossil Mollusca.



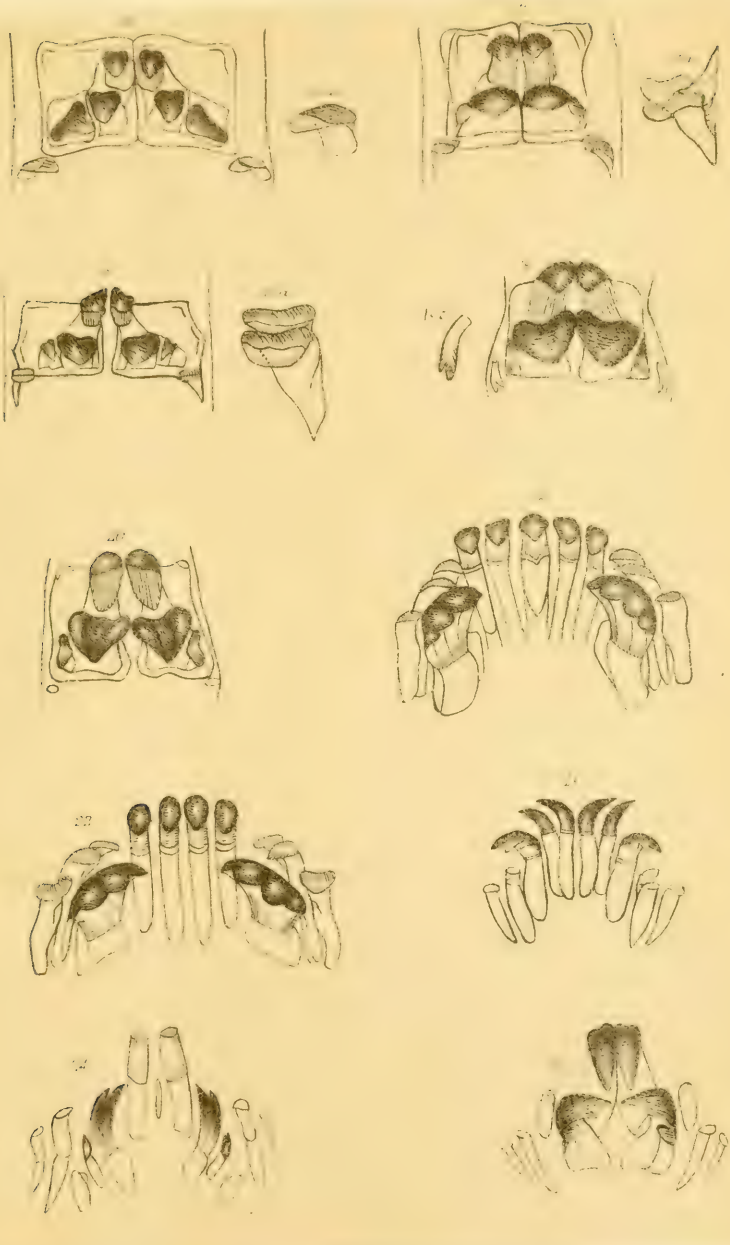

Lewis, On Land Shells of Tennesee




Conrad, Fossil Mollusca.



W. H. Dall, On the Limpets



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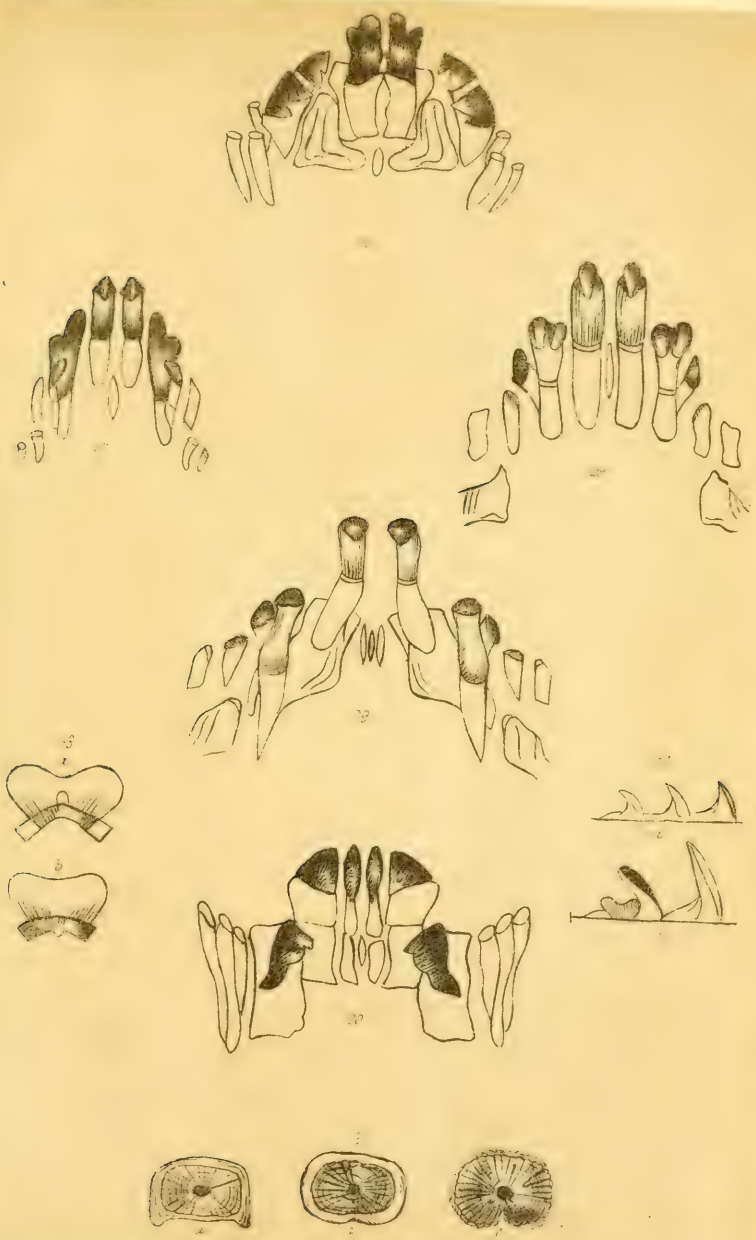

W. H. Dall, On the Limpets

# AMERICAN

# JOURNAL OF CONCHOLOGY.

NEW SERIES.

PUBLISHED BY THE

CONCHOLOGICAL SECTION of the Academy of Natural Sciences of Philadelphia

VOL. VI. 1870–71. PART 4.


*Annual Meeting Dec.* 1*st*, 1870.

Ten members present.

DR. RUSCHENBERGER, Director, in the chair.

Several additions to the Museum and Library were announced,

The following papers, offered for publication in the Journal. were referred to committees:

"Descriptions of Nudibranchiate Mollusca inhabiting Polynesia, No. 1." By Wm. Harper Pease.

"Notes on some new forms of Terrestrial and Fluviatile Mollusca found in Trinidad." By R. J. L. Guppy.

"On the Lingual Dentition of Pompholyx effusa." By W. G. Binney and Thomas Bland.

"Palæontological Notes." By T. A. Conrad.

"On the Opercula of the family Strepomatidæ." By W. D. Hartman, M. D.

"Note on Waldheimia pulvinata, Gld." By J. G. Cooper, M. D.

"Notes on Gadinia and Rowellia." By J. G. Cooper, M. D.

"Additions and corrections to Catalogue of Monterey Mollusca." By J. G. Cooper, M. D.

"Notices and Reviews of New Conchological Works." By Geo. W. Tryon, Jr.

The Annual Reports of the Recorder, Secretary, Conservator, Librarian and Publication Committee were read. (See Appendix.)

The following gentlemen were elected Officers of the Section for the ensuing year:

| | |
|---|---|
| Director, . . | W. S. W. RUSCHENBERGER, M.D. |
| Vice-Director, . | GEO. W. TRYON, Jr. |
| Recorder, . . | S. R. ROBERTS. |
| Secretary, . . | REV. E. R. BEADLE. |
| Treasurer, . . | WM. L. MACTIER. |
| Conservator, . | EDW. J. NOLAN, M. D. |

## DESCRIPTIONS OF NUDIBRANCHIATE MOLLUSCA, INHABITING POLYNESIA.

BY W. HARPER PEASE.

The following series of nudibranchiate mollusca was collected by Mr. Andrew Garrett, and the drawings from which the figures are taken were made by him from the living specimens, and may be relied on as strictly accurate. It will be noticed, that with few exceptions all the Genera heretofore described from the East Indies by Dr. Kelaart, Mr. A. Adams and Alder and Hancock, inhabit Polynesia. I do not discover, however, that any one species is common to the two localities. Our knowledge at present is too limited to allow us to offer any idea as to the distribution of genera and species over the tropics, or compare them with those inhabiting the temperate regions. As the anatomy of the genera is worked out, especially of the widely diverse forms now included under genus *Doris*, which abound over Polynesia, it will be found necessary to separate many now confounded, especially those supposed to be common to the tropical and temperate provinces. It becomes more evident from year to year, as our researches extend, that the distribution of the genera of shell-bearing mollusca is confined to isothermal lines, and such will prove to be the case with the above order, with few exceptions.

### Genus DORIOPSIS, Pease.

Proc. Zool. Soc., London, 1860, p 32.

The above genus, founded on a species inhabiting the Hawaiian Islands, has been confirmed by two others from southern Polynesia, which agree with the type in their generic characters, though specifically widely distinct.

The genus may now be characterized as follows :

"Body oblong, oval, depressly convex above, surrounded equally on all sides by a flat, depressed marginal mantle, cover-

ing the head and foot. Dorsal tentacles two, lamellate and retractile. Oral tentacles none. Branchiæ simple, linear, pinnate, surrounding the posterior end of the body, retractile into a semicircular slit."

In the Transactions of the Zool. Soc., London, 1864, p. 124, Messrs. Alder and Hancock adopt the above name *Doridopsis* * for a genus inhabiting India. The species cannot be distinguished externally from the typical forms of *Doris*. The authors discovered, however, that the mouth was suctorial, without teeth or jaws. From this peculiarity, I propose to distinguish it by the name of "Hanstellodoris," the names of both the authors being pre-occupied.

I take occasion to note that the genus *Phyllobranchus* (Alder and Hancock) Trans. Zool. Soc., London, 1864, p. 145, is synonymous with *Polybranchia* (Pease) Proc. Zool. Soc., London, 1860, p. 141. This genus differs widely from any previously described and may be easily recognized. The only difference between the species described by Alder and Hancock from India and those inhabiting Polynesia, is that the branchial lobes on the former are slightly indented at their upper termination. On examining several specimens after the original description was published, I came to the conclusion that the radiating lines enclosed in the lobes were not branchiæ, and consequently changed the name of the genus to "*Lobifera*." As Messrs. Alder and Hancock have decided them to be true branchiæ, the original name should be retained.

DORIOPSIS SCABRA, Pease. Plate 19, fig. 2, a, b, c.

Body coriaceous, subpellucid, pale orange yellow, oval, rounded above, slightly the widest at the middle, covered with minute filiform asperities.

Dorsal tentacles remote, oblong ovate, mucronate, erect, closely lamellate, retractile into simple cavities, peduncles short.

Branchiæ small, plumules 10, linear, pinnate, procumbent, decreasing in length either way from the two central ones, projecting beyond the mantle posteriorly. Head without labial appendages. Foot oblong oval. Dorsal tentacles and branchiæ colorless.

Length, six-tenths of an inch.

*Habitat*, Tahiti.

*Station*, (under stones, in the upper region of the laminarian zone. Motions extremely sluggish. A.G.)

* The letter d was dropped for the sake of euphony.

DORIOPSIS VIRIDIS, Pease. Plate 19, fig. 1, *a*, *b*, *c*.

Proc. Zool. Soc., London, 1861, p. 244.

We furnish a figure of this species in further illustration of the genus.

? TRIOPA GRACILIS, Pease. Plate 19, figs. 3, *a*, *b*, *c*, *d*.

Body elongate, narrow, rounded above, becoming laterally compressed behind the branchiæ, and tapering to an acute point posteriorly, rounded in front; subpellucid, pale cream color, and ornamented with small acute orange yellow papillæ.

Margin of the mantle provided with a series of tentacular processes, which are the largest in front, and diminishing gradually posteriorly.

Head conspicuous and furnished with small cylindrical tapering appendages.

Dorsal tentacles ovate, mucronate, coarsely obliquely lamellated, subretractile (so that the tips are only visible). Eyes distinct, immediately behind the tentacles. Branchial star about the middle of the body, very small, much narrower than the mantle, plumules eight, rounded, arborescent, and retractile into a simple common cavity.

Vent a prominent tube. Foot very thin, pellucid, colorless, widest anteriorly, gradually tapering posteriorly, where it is wider and longer than the body.

Length one inch.

*Habitat*, Huaheine.

*Station*, (on sea weed at low water mark. Motions lively. A. G.)

*Remarks.* I refer the above species to genus *Triopa* with some doubt, being hardly probable that it is related generically to the species inhabiting Great Britian, on which the genus was founded. No species, so far as I can learn, has been described from the tropics.

One has been discovered at the Cape of Good Hope and one from South Australia.

TREVELYANA PICTA, Pease. Pl. 20, fig. 1.

Animal pellucid, smooth, very delicate, considerably compressed, dorsal region much elevated at the middle, where it is also the widest, tapering either way, more suddenly posteriorly. Color pale watery white, and conspicuously marked with a few remote, bright orange red circular spots, some of which are

elevated, forming rounded tubercles. Foot margined with orange. Dorsal tentacles small, compressed, oblong, ovate, tips rounded, erect and furnished with about twelve very oblique coarse lamellæ, retractile into simple cavities, the upper and anterior portions bright orange red.

Labial tentacles fused into a veil, which is notched in front.

Branchial star large, non retractile, wider than the body and consisting of twelve or more suberect, bipinnate plumules, of a narrow lanceolate form, encircling the vent, which is a simple orifice, rachis of the plumules bright orange red. Foot large, very thin, much wider than the body, truncate in front, widest on the posterior half, lance pointed behind and projecting considerably behind the body.

Length, two and a half inches.

*Habitat.* Island of Huaheine.

Goniobranchus albomaculatus, Pease. Plate 20, fig. 2, a,b,c.

American Jour. of Conch., vol. 2, 1866, p. 204.

Bornella arborescens, Pease. Plate 20, fig. 3, a,b,c.

Body smooth, subpellucid, elongate, rounded above, somewhat compressed, tapering posteriorly into a bifid tip. Branchial processes six on each side of the back, opposite, cylindrical, tapering to a point, the first trifid, the succeeding four bifid, and the last simple; from the inner axillæ of each process arises small, pinnate branchiæ. The head furnished anteriorly with two stellated processes, the rays being about ten or twelve in number, unequal in size. Mouth just in front of the locomotive disk, and between the stellated processes.

Tentacles compressed, lanceolate, pinnate, retractile into large cylindrical tapering sheaths, which terminate in four unequal tapering branches. Foot or locomotive disk narrow and grooved. At the base of the tentacular sheaths are immersed two black specks, which, possibly, may be eyes. Color pale cream yellow, finely reticulated with orange and the upper portion of all the processes zoned with orange red. Foot colorless.

Length, one and a half inches.

*Habitat.* Tahiti.

*Remarks.* In addition to the two species collected by Mr. Adams, during Voy. Samarang, on which the genus was founded, two others have been discovered inhabiting Ceylon and South

Australia. The above is the most nearly allied to *B. digitata* (A. Ad.) from which it differs in the number and character of its branchial and tentacular processes, &c.

As remarked by Mr. Adams, the animal lives on sea weed, for which its foot is adapted, is active and occasionally swims by rapid lateral undulations of its body.

PLACOBRANCHUS GRACILIS, Pease. Plate 21, fig. 1, a, b.

Animal oblong, depressed, tapering posteriorly and truncate behind. Head broad, cordiform in front. Tentacles tapering, involute. Eyes black, on a slight prominence between the tentacles. Veil cordiform in front and slightly auriculate. Color cream yellow, with shades of a pale dove color, sides shaded with light ochre yellow. The posterior end margined with violet, also the anterior edge of the head and veil. Tentacles annulated with violet near their tips and a shade of the same color beneath. The upper surface is closely ocellated with small, irregular sized, olivaceous yellow round dots, with whitish irides. Along the sides and on the front of the head the ocelli are larger, with bluish green pupils, black and white rings. The lower surface is bluish white and closely ocellated with irregular sized olivaceous yellow pupils and white irides. Branchiæ deep grass green.

Length, two inches.

*Habitat.* Tahiti.

PLACOBRANCHUS VARIEGATUS, Pease. Plate 21, fig. 2, a,b.

Animal smooth, elongate, oblong, truncate behind, sides nearly parallel, and slightly tapering posteriorly. Head large, broad, rounded and slightly emarginate in front. Tentacles large, grooved and blunt. Eyes approximating on a prominent tubercle, between the hinder bases of the tentacles. Veil well developed, rounded in front, auriculate, with a slight anterior emargination.

Color pale brownish grey, paler beneath. The upper part covered with closely set ocelli; those on the mantle have ochre yellow pupils, and white irisis; among them are interpersed a few black dots and rings. Along the sides, the pupils of the ocelli are rich yellow. The ocelli on the head have yellow pupils and white irisis. Beneath the ocelli are much more remote, and have black pupils. The branchiæ are rich green.

Length, two and a half inches.

*Habitat.* Island of Huaheine.

*Station*, (on sea weed in sheltered places. They are very active and when at rest the tentacles are recumbent, like the ears of a rabbit. A.G.)

PTEROGASTERON MARGINATUS, Pease. Plate 21, fig. 3.

Mantle lobes, when spread out, oblong cordate, margins somewhat waved. Tentacles stout, ear shaped and somewhat involute. On the interior surface of the mantle lobes, three pale lines radiate from the posterior part of the body on its left side and two on the right, one of the latter bifurcate, which probably are the branchiæ.

Color olivaceous green, gradually becoming greenish white beneath; somewhat remotely dotted with black and opaque white.

Mantle lobes margined with orange, white and black. There is a tinge of orange at the tips of the tentacles and an oblong white spot on each. The inner surface of the lobes is the same color as without, but paler and fewer spots.

Length, two and a half inches.

*Habitat.* Island of Huaheine.

PTEROGASTERON RUFESCENS, Pease. Plate 22, figs. 1, a,b,c.

Animal rather slender, truncated behind. Color rufous brown passing into whitish beneath, and olivaceous brown on the head. Closely spotted with small, irregular, greenish white spots, which gives the ground color a reticulated appearance.

Front of the head, in the region of the lips, white. Tentacles lineated with greenish white, and tinged with violet on their outer part. Mantle lobes edged with dark lead color, and an intramarginal orange line. Disk pale with opaque white spots. Inner surface of the lobes edged the same as outside, but the ground color is greenish lead, becoming paler centrally, with whitish spots, and remotely punctured with vermillion. Eyes pale with black pupils.

Length, one and a quarter inches.

*Habitat.* Tahiti.

PTEROGASTERON NIGROPUNCTATUS, Pease. Plate 22, figs 2, a, b, c, d.

Mantle lobes rounded behind; tentacles stout, upper lip bilobed; locomotive disk small. Color olive green, clouded with darker, paler beneath, and finely reticulately veined with darker green. The whole surface with small irregular whitish spots and punctured with jet black, the latter small beneath, larger

and crowded along the margins of the mantle lobes, and on the tentacles. The inner surface differs but slightly, being only much paler centrally and unclouded.

Length, one inch.

*Habitat.* Tahiti.

*Remarks.* There is little doubt but that the branchiæ in this genus are immersed in the surface of the mantle lobes, radiating in lines from the body, as in genus *Placobranchus*.

*Elysia grandifolia*, *E. punctata* and *E. cærulea*, (Kelaart) inhabiting Ceylon, belong to the above genus. The provisional name, *Hydropsyche*, proposed for the genus by Dr. Kelaart, being pre-occupied, the above will take precedence.

## NOTES ON SOME NEW FORMS OF TERRESTRIAL AND FLUVIATILE MOLLUSCA FOUND IN TRINIDAD.

BY R. J. LECHMERE GUPPY.

### I.

Mr. Thomas Bland communicated in 1868, to the *American Journal of Conchology* (vol. iv, pt. 4), a memoir on the land shells of Trinidad and other islands. Since the discoveries referred to by Mr. Bland in that paper, I have detected some additional species, two of which appear to belong to genera previously unknown. The descriptions of some of these shells have been published in the Proceedings of the Scientific Association of Trinidad for December, 1868; but further notice of them, and especially of the new genus *Autonoe*, may be of interest. Other species are now herein described for the first time.

The genus *Autonoe* was created by me, in the publication above mentioned, for a shell which bears a certain resemblance to a *Melampus*, but differs from that genus, especially in its texture, which resembles that of a land-shell.

I append the following technical diagnosis of the genus.

AUTONOE, n. gen. Plate 17, Fig. 1.

Testa tenuis, cornea, ovato-obconoidalis; anfr. ultimus compressus, superne paulum angulatus; spira brevis, conoidalis; apertura elongata, angusta, ante paulum dilatata; peristoma simplex; columella valde torta, arcuata, plicis fortibus munita.

*Autonoe riparia*, the species on which the genus is founded, is a nearly smooth ovate-obconoidal shell of about five whorls, whitish under a straw-colored epidermis. The aperture is nearly the length of the shell, widened below, the inner lip covered with a callus and furnished with a strong plait. The columella is strongly twisted.

Length 10 mill., breadth, 6 mill.

I found one example only on Mayaro Point, amongst the bushes, some ten or twelve feet above the highest limit reached by the waves of the sea, a habitat, it will be noticed, very similar to that of the *Auriculidæ*.

## II.

Two species of small heliciform land-shells, of which I gave descriptions in the Annals and Magazine of Natural History (4 ser. i, p. 440), under the names respectively of *Zonites implicans*, and *Z. umbratilis*, require pictorial illustration to render clearer their differences. I take the opportunity of appending sketches of them.* Plate 17, figs. 2 and 3.

Two other species present some resemblance to the *Helix harpa* of Say, and probably may be found to belong to the same group (*Zoögenetes* of Morse). These I have described in the Proceedings of the Scientific Association of Trinidad (Dec., 1868), as *Helix ierensis* and *H. cæca*. Of the former, I append a sketch. Pl. 17, fig. 4. *H. cæca* differs in being more elevated and less openly umbilicated, and in having a nearly circular rather than a lunate aperture. Mr. Ralph Tate has found *H. ierensis* in Venezuelan Guiana and St. Lucia, and in Nicaragua he has discovered an allied form (*H. cœcoides*, Tate).

*Helix bactricola*, a species described by me in the Annals of Natural History (l. c.), is of a very different type. The sketch (pl. 17, fig. 5), does not exhibit very clearly the character of the costellation, but it will serve to give an idea of the shape of the shell. The ornamentation is of the same character as that of *H. rotundata*, Müll., and *H. perspectiva*, Say, and the shape of the whorls and umbilicus is also similar. *H. bactricola* is much more elevated; but that character, although it might be scarcely in accordance with the existing technical definition of the group *Patula* (depressa, discoidea, vel turbinata), ought not, in my opinion, to exclude the Trinidad species from it.

## III.

I have recently been fortunate enough to discover additional examples of *Bulimulus aureolus*. The specimens from which the species was described by me in the Annals and Magazine of Natural History (1866) were young and imperfect. The adult shell has 6½—7 whorls; its lip is acute and slightly effuse. It is generally of the most beautiful transparent yellow, but I have found some white examples, and a banded variety is not uncommon. The latter bears considerable resemblance to *B. multi-*

* There was an error in my original description of *Z. umbratilis*. The umbilicus is not *wider* than in *Z. implicans*, but it is *deeper*. The figures here given are of extreme forms.

*fasciatus*, but, on the whole, the nearest alliance of the species seems to me to be with *B. pœcilus*, d'Orb. I think that the shell described by me as variety *imperfectus* may be referred to this species, rather than to *B multifasciatus* or *Vincentinus*. Another form of *B. aureolus* occurs in Tobago, specimens having been kindly furnished me by Governor Rawson, C. B. This variety (which I propose to call *Rawsoni*) is exceedingly remarkable as bearing the same relation to the Trinidad *B. aureolus*, as the Tobagan form of *Bulimus oblongus* does to the Trinidad type of that species. There are, therefore, the following forms of *Bulimulus aureolus*:—

Var. $\alpha$ *typicus*, (yellow).
Var. $\beta$ *albescens*, (white).
Var. $\gamma$ *fasciatus*, (banded).
Var. $\delta$ *imperfectus*, (small banded).
Var. $\varepsilon$ *Rawsoni*, (dead white with yellow umbilicus and apex).

The following are the dimensions of a large example of the typical form: Length, 25 millimetres; greatest breadth, 10 mill.; height of aperture, 10 mill.

I add a figure of var. $\varepsilon$. Pl. 17, fig. 6.

A single example of *Simpulopsis corrugatus*, lately found by me, although not quite adult, has enabled me to ascertain the characters of the dentition of the genus, which resemble those of *Succinea* more than I had anticipated. The odontophore is moderately large, but the individual teeth are very minute, and resemble those of *Succinea*, particularly, perhaps, *S. ovalis*.

## IV.

A visit recently made by me to the Cerros of Oropuche, in the eastern part of the northern chain of mountains of Trinidad, furnished me with two new forms of *Gasteropoda*. In the same district, I found specimens of the *Diplommatina*, previously discovered near the Maracas water-fall. Its occurrence in the almost untrodden mountains of Oropuche impressed me strongly in favor of its claims to be considered an indigenous and not an introduced species, a question upon which there has been some controversy. It seems to me improbable that an introduced species of so delicate a nature as the *Diplommatina* should be found so far up in these forest-clad hills.

In the present communication, I include an account of a new *Planorbis*, a *Buliminus*, and an *Ancylus*, lately found by me in Trinidad.

HYALINA ALICEA, n. sp.

Shell depressed, planorbiform, white, rather evenly convex above, and openly umbilicate beneath; whorls 5—6, subcarinate rather below the middle, marked by close and fine sinuate lines of growth, the last whorl descending more than the others; apex scarcely above the level of the penultimate whorl; aperture rather semioval, narrowed above and produced in breadth by the imperfect carination of the whorl; lip sharp; peristome produced above and retreating below; umbilicus open, showing all the whorls. Greatest breadth 8 millimetres, height 2½ mill.

In shape, this shell approaches *H. concolor*, Fèr., but its color is more nearly that of *Macrocyclis concava*, and in size it is much smaller than either of those species. It is not altogether unlike the *H. skiaphila* of D'Orbigny's South American shells, but it differs in being flatter and in the tendency to carination of the whorls.

BLANDIELLA, n. gen.

Testa imperforata, cylindrica, cornea, vix nitens, anfr. numerosi, convexiusculi, lente accrescentes, sinuato-costellati; ultimus paulum productus; apex obtusus, truncatus; apertura subovalis; peristoma expansum, continuum, paulum reflexum. Operculum paucispirale, internè cartilagineum, externè calcareum, rugosum.

Testa *Geomelaniæ* similis, sed sine appendice linguiforme.

This genus is allied to *Geomelania*, from which it is distinguished by the peculiar operculum, and the want of a linguiform appendage to the labrum.

BLANDIELLA RECLUSA, n. sp. Pl. 17, figs. 7 and 8.

Shell cylindrical, whitish-horny, rather solid; whorls 5—6 when adult, about 4 having been lost by truncation; each whorl adorned with about 30 fine, slightly-sinuate riblets; peristome white, shining, thickened, continuous, somewhat reflected, especially anteriorly. Operculum pauci-spiral, the outer surface calcareous and roughened by a series of somewhat irregular elongate tubercles or ridges, highest near the outer margin; the inner cartilaginous layer forming thin edges beyond the outer layer. Length of shell (exclusive of the part lost by truncation) 7 mill., greatest breadth 2½ mill.

I have examined the lingual dentition of this species, and it seems to me to indicate that the proper place of the genus (probably with all the *Aciculidæ* and *Truncatellidæ*) is intermediate between the *Cyclophoridæ* and the *Paludinidæ*. I should, there-

fore, place it provisionally in the *Phaneropneumona*, in a separate order from the Rhipidoglossal mollusks allied to *Cyclostoma* and *Helicina*.

*Hyalina alicea* and *Blandiella reclusa* have hitherto only been found on the Oropuche mountains.

BULIMINUS PILOSUS, n. sp. Plate 17, fig. 9.

Shell oblong conic, rather thin; horny-brown-colored, covered with a fine, but not very close pubescence; whorls about 6, rather ventricose, and separated by a deep suture, the last whorl forming nearly two-thirds of the length of the shell; apex obtuse; aperture oval, slightly oblique; peristome acute, columella broadly reflected over the deep umbilicus. Length 14 mill., breadth 7 mill., height of aperture 6 mill.

This species (which I refer to the same genus as *B. montanus* and *B. obscurus*) is related to a form collected in Venezuelan Guiana by Mr. Tate, and, so far as I know, undescribed as yet. But the latter has a very close pubescence, arranged in fine spiral lines. It is also larger, and its peristome is thickened and everted, a feature I have not observed in our shell. The Venezuelan shell forms a white calcareous epiphragm. The only species of d'Orbigny's which bear any resemblance to *B. pilosus* are *B. crepundia* and *B. trichodes*, whose proportions are much more elongate.

The genus *Buliminus* does not seem to be represented in the West Indies, unless the shell now described, and that from Dominica, named by me *B. stenogyroides*, should prove to belong to it, which I think probable.

PLANORBIS MENISCUS, n. sp.

Shell depressed, brownish horn-colored, diaphanous, gently convex above; apex sunk, base slightly concave; whorls about 5, rounded above, flattened beneath; aperture nearly semilunate, its basal margin nearly straight, owing to the flattening of the whorls.

The Planorbis now described approaches nearest to *P. paropseides*, a species described by d'Orbigny, from South America. In the form of the whorls and aperture, there is much resemblance between these species, but ours differs in being larger and thicker. My largest specimen measures 6 mill. in extreme width, and its greatest thickness (= height of last whorl) is $1\frac{1}{2}$ mill.

Chatham River, Erin., Trinidad.

ANCYLUS TEXTILIS, n. sp. Pl. 17, figs. 9, 10, 11.

Shell suboval, rather depressed, thin, horny-brown-colored, minutely decussate; apex recurved towards the right margin, which it approaches rather closely. A large example measures in length 6 mill., in breadth 4 mill.

This *Ancylus* is near to *A. culicoides*, d'Orb., from Guayaquil, but most of my examples are of more oval figure, and the apex is generally more decidedly recurved. There is considerable variation in the proportions of the shell, some examples resembling *A. concentricus*, d'Orb. Small specimens are liable to a peculiar monstrosity, consisting in the development of a plate, joining more or less extensively the margins of the aperture. This plate is usually slightly convex, and when, as in some cases, only a small opening is left for the exit of the animal, the edges of the opening are a little produced and everted. Fig. 11 shows this form; Fig. 10 shows the aperture partly closed; Fig. 9 is the upper surface.

Chatham and Santa Cruz Rivers, Trinidad.

Bland has suggested to me that *Ancylus textilis* is a *Gundlachia*. In all the largest examples which I have seen, there is no trace of the *septum* commonly found in young shells, and occasionally present in older or medium-sized individuals, such as those of which I give figures. A number of young specimens, developed in my aquarium, showed the septum, but many of equal size had no sign of it. I should say, then, that my species is an *Ancylus*, which has sometimes, in its young state, the peculiar character of *Gundlachia*, but rarely so in its older state.

## ON THE LINGUAL DENTITION OF POMPHOLYX EFFUSA.

BY THOMAS BLAND AND W. G. BINNEY.

In the Annals of the New York Lyceum of Natural History, vol. ix, p. 290, we described and figured the lingual dentition of *Pompholyx effusa*. We now give a more detailed illustration on plate 18.

The individuals examined were among the specimens from which the species was, in the first instance, described. They were received by us from the Smithsonian Institution, with Dr. Lea's original label. There can, therefore, be no doubt about their identity.

The figures were obtained by photography, the negatives being taken directly from the microscope by our friend Mr. Sam. Powel. This process secures absolute accuracy up to the point of transferring the outlines upon the lithographic stone. Here, of course, we are dependent upon the fidelity of the artist.

To the description of the lingual already published, which we copy below, we have added more details regarding the recurved apex of the laterals.

Lingual membrane broad, with 22.1.22 teeth. Central teeth long, narrow, widening and knobby at the base; apex recurved, and produced into an obtuse beak. Laterals nine on each side of the central line, in a straight, transverse row, wide, quadrate, apex recurved, prolonged beyond the base of the tooth in a more or less broad blunt beak, which is normally furnished at either side with a short, sharp denticle. Marginals about thirteen on each side of the median line, in oblique, transverse rows, not attached to a plate, simple and not recurved; the first eight from the extreme lateral edge of the membrane long, narrow, arm-shaped, terminating in a wrist-like contraction and hand-like expansion, strongly digitate. The remaining marginals gradually changing into the shape of the laterals, but still not merging into them, the line of demarcation being strongly marked.

There is great variation in the beak-like projection of the recurved apex of the laterals, and still more in the digitation of the marginals.

## Reference to Plate 18.

*Figure C* represents the central tooth and one complete series of laterals on the upper line; the lower line gives only the fourth to the ninth lateral with the first marginal.

*Figure A* represents a group of teeth to illustrate the merging of the laterals into the marginals. The numerals on this and the other figures give the count of the teeth from the central line.

*Figure E* gives one line of teeth from the sixth lateral to within two teeth of the extreme edge of the membrane. It illustrates the passage from the laterals through the five intermediate marginals into the eight extreme marginals, as described above.

*Figure B* shows several of the outer marginals from another portion of the membrane.

All the figures mentioned above are from the same membrane. Fig. D is drawn from another membrane. It gives portions of two lines of teeth, showing centrals and most of the laterals. These last owe, perhaps, their appearance to hard usage or accident, but, as already observed, there is great variety in the recurved apex of the laterals.

## PALÆONTOLOGICAL NOTES.

BY T. A. CONRAD.

1. *Figure and Reference to Fasciolaria subtenta.*

FASCIOLARIA, Lam.

F. SUBTENTA, Conrad. Pl. 13, fig. 3.

Proceed. Acad. Nat. Sciences, 1864, p. 211.

2. *Synopsis of the Eocene species of Catinus.*

CATINUS, Link.

C. BILIX. Pl. 13, fig. 4, 7.

Obliquely oval, stria numerous, close, wrinkled; volutions 4, convex; spire very small, apex pointed; aperture effuse, oval, umbilicus small.

*C. bilix*, Conrad. Amer. Journ. Science, vol. xiii, p. 344, July, 1833.

*Natica striata* Lea. Contrib. p. 105, pl. 4, fig. 88.

Var. *declivus*, fig. 2. Slightly flattened on the disk towards the ventral margin; striæ very fine, shell rather thick.

The sculpture varies; in some specimens the lines are broad and divided by minute lines, in others the lines are fine, unequal or alternated and somewhat waved. This species probably agrees with the subgenus *Naticina*, Gray.

C. ARCTATUS. Pl. 13, fig. 6.

Discoidal, thin, flattened anteriorly, volutions 4, sculpture consisting of minute, unequal, much-wrinkled lines; base flattened or slightly concave, umbilicus closed in adult specimens by the reflexed labium; aperture oval, patulous.

*Sigaretus arctatus*, Conrad, Foss. Shells of Tert. p. 45, Aug. 1833.

*Locality.* Claiborne, Ala.

3. *Description of a new Fresh-Water and a Land Shell of the Oregon Tertiary.*

HELIX, Lin.

*Subgenus* ZONITES, Montf.

H. MARGINICOLA, Conrad. Pl. 13, fig. 9.

Depressed; spire scarcely raised above the margin of the last volution; whorls 6, convex-depressed; shoulder of last whorl subangular; umbilicus small; aperture obliquely subquadrate.

PLANORBIS.

*Subgenus* SPIRORBIS? Swains.

P. LUNATUS, Conrad. Pl. 13, fig. 8.

Spire profoundly depressed with a subangular margin; umbilicus with a rounded margin, profound, and exhibiting 6 volutions; aperture narrow, lunate.

*Locality.* Bridge Creek, Oregon.

Dr. Leidy informs me that these two shells were found by Rev. Thomas Condon, of Dallas City, Oregon. They were in the same rock which contains the remains of *Oreodon superbus*, Leidy, *Lophiodon* and *Rhinoceros*.

## ON THE OPERCULA OF THE FAMILY STREPOMATIDÆ.

BY W. D. HARTMAN, M. D.

Having enjoyed facilities for the comparison of large quantities of operculæ of the various genera of the family Strepomatidæ, undertaken chiefly with a view to discover differences that might exist in this organ between allied species, I find it exhibiting as a family trait a homogeneousness of structure not usual in molluscous animals. In speaking of the operculæ of this family writers usually designate them as corneous. They probably differ from true horn in the larger percentage of siliceous or calcareous matter entering into their composition, a condition inferred from their brittleness and the ability with which they resist corroding influences. The organ in question, upon which so much of the safety of this helpless little mollusk depends, is secreted from small grooves or folds in the columellar margin of the operculigerous lobe, situated on the posterior part of the foot of the animal. These grooves are successively developed during the several stages of growth, and are more readily seen in the foot of an alcoholic specimen of some of the larger species from which the operculum has been forced off than in one perfectly fresh. The operculum is composed of semi-concentric or paucis-spiral laminæ or plates, each of which (as the animal matures) is more narrow and thicker next the columella and becomes wider and thinner as they approach the junction of the labrum with the body whirl. At every stage of growth the new lamina (which is partly overlapped by the preceding one) describes a larger arc of a circle, which imparts the paucis-spiral or fan-like form to the adult operculum. The imbricated arrangement of the lamina, visible to a certain extent by transmitted light under a low power, is more strikingly developed after boiling the operculum for a few moments in liquor potassa and moderate compression between two pieces of glass. It will then be evident that this organ is composed of semi-concentric plates, which are renewed from the columellar margin of the proligerous lobe, each layer being within and partly beneath the preceding one, like tile on a roof. Each plate is thicker on the columellar margin and tapers

off to a very thin edge, which, in its turn, is overlapped by the thick columellar margin of the preceding plate. The usual form of the operculum of such Strepomatids as I have examined is oval or subtriangular, embracing a spiral of three or four turns, the polar point being near the base, but they are subject to such great deviation that, of large numbers belonging to the genera *Goniobasis*, *Eurycælon*, *Schizostoma* and *Leptoxis*, the usual form is that of a sub-spiral, the central lamina exhibiting the spiral character, having become abraded or worn off. In the genera *Trypanostoma*, *Strephobasis*, *Lithasia* and *Io*, the operculum is similar in structure to the genera before mentioned, the shape in *Trypanostoma* being usually oval, while in the latter it is subtriangular. In these genera it is stouter in proportion to the size, more coarsely laminated, less elastic and with an oval depression at the polar point, its small size enabling the animal to retire to a position far within the aperture, where the closure becomes perfect. It would seem that the central portion of the operculum, having been secreted in the earlier stages of the animal's existence, the plates of which it is composed are thinner and more elastic at this point, and owing to the continued action of the foot in closing the aperture, the concavity is produced which is observed in these genera. In several genera the opercula, when dried, present a more or less twisted appearance, which is due to their varying thickness and the shape of the aperture into which they are forcibly drawn by the animal during their growth.

In *Goniobasis Showalteri*, Lea, and *Leptoxis rubiginosa*, Lea, this organ, in some individuals inhabiting still water, presents a continuous growth. The earlier formed laminæ, of which it is composed, is pushed off from the proligerous lobe in the direction of the labium, forming a free margin as in the human nail; in such specimens the spiral character of the operculum is absent, th s organ forming a long wedge-shaped ribbon, the free end of which coils inward, partly by the force of its own elasticity, but chiefly from the direction given by the imbricated arrangement of its laminæ.* In many specimens of operculæ the polar point mentioned by authors is not the centre of the spiral, the centre having been broken off in the continuous growth just alluded to, but that which is taken for the polar point is a folding or partial twisting upon itself near the base of the aperture of each plate of which it is composed, constituting, in the great majority of instances, the form met with in the genera *Goniobasis*, *Eurycælon*, *Schizostoma* and *Leptoxis*. With these genera the margin of the

* See Lea's Obs., vol. 9, page 42, pl. 24, fig. 4.

operculum in contact with the labrum is generally more or less detached from the foot; it is also much thinner and more elastic at this point, an arrangement conducing to greater flexibility, and, as a consequence, the animal is enabled to retire farther within the aperture where the closure becomes complete.

In *Leptoxis Foremanii*, Lea, that portion of the operculum in contact with the labrum presents a beautiful, serrated appearance (plate 21, fig. 4), and is the only one of this character observed in the examination of a wide range of species. The color of the operculæ of the *Strepomatidæ*, when viewed by transmitted light, is usually a dark reddish brown, while a few are of a pale brown or a light yellow color. In the adult operculum, beside the whole inner surface being strengthened by a general deposit from the operculigerous lobe, there are often two or three bands running from the polar point towards the superior angle, and some of the larger species of *Goniobasis* and *Schizostoma* present, on their inner surface, fasciculi of irregular, radiating striæ, which seemingly strengthen the attachment of this organ to the operculigerous lobe.

In foreign *Melanidæ* the growth and structure of the operculum is similar to the *Strepomatidæ*, except that it is more finely laminate and the spiral character is always present, a condition probably owing to their inhabiting still water, while the *Strepomatids* are generally denizens of rapid and rocky streams. So far as I have examined, with one exception,* the number of spiral turns in the operculum of native and foreign *Melaniens* bear no relation to the number of whirls in the shell, the deposit of the semi-concentric plates being seemingly limited only by the growth of the animal and the necessity for a perfect closure of the aperture of the shell.

The spiral character of the operculum indicates the design (so far as it relates to the external covering in this family) to carry out the bi-lateral form.

When the animal retires within the shell the posterior half of the body is folded on the anterior, resembling, in its action, the shutting of a clasp-knife, after which the head and body is withdrawn, leaving the operculum, which is situated on the end of the tail, to close the aperture.

* In *Melania Largillierti*, Phil., the number of turns in the shell and operculum correspond, being seven in each.

## NOTE ON GADINIA AND ROWELLIA.

BY J. G. COOPER, M. D.

In Mr. Dall's late article on *Gadinia* he founds his description wholly on the species which is the type of *Rowellia*, and assumes that all former investigators must have been mistaken, because their types did not agree with that before him. A naturalist as cautious in associating similar shells without comparing the soft parts, might have better hesitated before asserting that Dr. Gray, Dr. Philippi and the Adams were all mistaken, because there is a similarity in the *shells* of the species described and figured by them, to the one which he has alone examined. It is certainly *not proved* by his assertions that the species are congeneric.

The young living specimens found by me at Catalina Island, on which I founded *Rowellia*, were living on the under sides of stones, between tides, and were submerged during part of the day. Not having means for more than a sketch of their external form I made one, resembling that on plate 2, fig. 6. The tentacles in this appear as if "pectinated" or divided in a serrate manner. On comparison of this with the animal figured by the Adams as a *Gadinia*, (which we may suppose was drawn by one of them from life, while on one of his tropical collecting tours), the differences are so marked that I proposed the subgenus *Rowellia* for our species, in honor of the zealous conchologist who first obtained it in California. Now, according to Mr. Dall's own table of synonyms, all preceding names were founded on the Mediterranean species (except, perhaps, *Muretia*, D'Orb., preoccupied by Gray as *Mouretia*.) It is, therefore, *still to be proved* that *Rowellia*, of which the anatomy is so well described by Dall, is not a good genus.

As to its specific identity with the tropical "*G. reticulata*, Sby.," I will not pretend to decide, but as that species is "reticulate" above, and ours simply radiately ornamented or ribbed, (with occasional concentric lines of growth crossing the rays), it appears safest to consider them distinct until better means of comparison are offered. In the *Fissurellidæ* great importance

is attached by Carpenter himself to minute details of sculpture, and I have found species, in that family and others, of which the shells are scarcely distinguishable, to differ generically in the soft parts.

Mr. Dall says that the "tentacles are consolidated and lost in the expanded lobes of the muzzle." He then proceeds to name these lobes "ears," although they undoubtedly serve the purpose of tentacles, that is, for touch, while their auditory function is doubtful, though possible. His highly magnified figure shows that, instead of being pectinated, the serrated marks are merely colored, (or indicate internal folds, if I understand him.)

It is certain that in my young ones the tentacles were subcircular, and appeared from above flat and lobed.

It is quite possible that the young animal is different in form, and really branchiate, afterwards leaving the water and becompulmonate. I have found the adult at Santa Cruz above the highest tides as described by Mr. Dall. Larval differences exist among mollusca, quite as strange, and are familiar to us in the higher Batrachia.

## NOTE ON WALDHEIMIA PULVINATA, GLD.

BY J. G. COOPER, M. D.

In Mr. Dall's recent review of the *Terebratulidæ* he makes the statement that the range of distribution given by me, in my Geographical Catalogue, for the above species, namely: "Puget's Sound to the Arctic Sea," is "entirely gratuitous."

If Mr. Dall (and others) will look at Dr. P. P. Carpenter's report to the Brit. Assoc. for 1863, p. 586, they will find "*T. pulvinata*, Gld., Arctic Ocean, gravel 30 fms.," as collected by Dr. W. Stimpson, and determined by Dr. Gould himself (p. 583). They may also rest assured that I can give good authority for all the ranges of species in the Catalogue.

## ADDITIONS AND CORRECTIONS TO THE CATALOGUE OF MONTEREY MOLLUSCA, PUBLISHED IN THE AMERICAN JOUR. CONCHOLOGY, VOL. VI, PART 1, p. 49.

BY J. G. COOPER, M. D.

Having lately received from Dr. Carpenter a number of specimens sent to him for identification, I find eighteen additions to my Catalogue of California Shells, and the following particularly relating to my Monterey collection:

Original No. 462. Cat. No. 86. *Clementia subdiaphana*, Cpr. Range, Str. Fuca to S. Diego. One valve dredged 20 fms. Also southward.

O. No. 373. C. No. 141. *Cryptodon serricatus*, Cpr. Str. Fuca to Monterey. Cat. I. 3 dredged 30 fms., living.

C. No. 594. *Alvania reticulata*, Cpr. Neeah Bay to Monterey. One dead.

C. No. 599. *Barleeia haliotiphila*, Cpr. Monterey (to Lower Cal.?) One dead.

C. No. 661. *Odostomia nuciformis*, "var. *nitens*," Cpr. Monterey. One dead.

O. No. 427. C. No. 662. *Odostomia satura*, Cpr. Neeah Bay to Monterey. One dead, bch. ("Not *O. gravida*, Gld.")

C. No. 666. *Odostomia straminea*, Cpr. Monterey to Lower Cal. 1 dead.

O. No. 1162. C. No. 680. *Chemnitzia Gabbiana*, Cpr. Is a form of No. 678, *teste* Carpenter.

O. No. 459. C. No. 681. Also considered a var. of *C. torquata*, by Carpenter.

O. No. 421. C. No. 683. Considered a form of 671, *C. tridentata*, by Carpenter.

C. No. 704. *Cerithiopsis munita*, Cpr. Neeah Bay to Catalina Id. Rare, dead.

O. No. 515. C. No. 776. *Muricidea squamulifer*, Cpr. "Probably = *foveolata*, Hds., but *Barbarensis*, Gabb, probably = *perita*, Hds., both from Lower Cal."

I thus add eight species to the list, drop one, and reduce four to varieties, making the total for Monterey two hundred species.

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CORRECTIONS—Page 56 *et seq.*

By some unaccountable mistake, the sign † before Catal. Nos. 246, 249, 253, 427, 503, 586, 765, 766, was changed by the printers to *, so that they appear to have been discovered at Monterey instead of elsewhere, though Santa Cruz is correctly given as the locality, and the table requires eleven † marks.

Page 66, No. 680. Omit the words "Carpenter's list."

NOTE. The following should have their northward range extended to Bodega Bay, lat. 38° 15′, where Dr. Newcomb and Mr. Stearns collected them, (see list in Proc. Cal. Acad. Sci., III, 382, 1868): Nos. 48, 108, 114, 178, 179, 452, 460, 470, 475, 518, 539, 624, 628, 664, 693, 733.

# NOTICES AND REVIEWS

OF

# NEW CONCHOLOGICAL WORKS.

BY GEO. W. TRYON, JR.

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## BRITISH.

**Report of the Thirty-ninth Meeting of the British Association for the Advancement of Science**; held at Exeter in August, 1869. 8vo. London.

*On the Land and Fresh-water Mollusca of Nicaragua.* By RALPH TATE.

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**Conchologia Indica**; being illustrations of the Land and Fresh-water Shells of British India. Edited by SYLVANUS HANLEY and WILLIAM THEOBALD. Part I, 4to, 20 plates, colored. London, 1870.

A very valuable and much-needed work, prepared by gentlemen who thoroughly understand their subject. The text does not include descriptions, but full synonymy and localities.

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**Annals and Magazine of Natural History.** Vol. 5, No. 30. London, June, 1870.

*On some Species of Proboscidiferous Gasteropods which inhabit the Seas of Japan.* By ARTHUR ADAMS.

This paper is a continuation of a list of Japanese Gasteropods noticed by me on several previous occasions.

The species of the families Tritonidæ, Buccinidæ, Fasciolaridæ, Volutidæ, Cassidæ, Doliidæ and Sycotypidæ, collected by the author, are enumerated. The following are new:

*Simpulum lirostoma*,
" *papillosum*,
" *nodiliratum*,
" *tringa*,
*Cabestana dorsuosa*.
*Epidromus reticosus*,
*Volutharpa Fischeriana*,
*Zeuxis clandestina*,
*Cyllene gibba*.

Mr. Adams remarks that *Buc. Yessoensis*, Schrenck, and *Euthria badia*, A. Ad., belong to Stimpson's genus *Urosalpinx*, first described in *this Journal*.

*Norwegian Mollusca.* By J. Gwyn Jeffreys.

This paper gives a list, with remarks, of a large number of species dredged by the author at Dröbak in Christianiafiord.

The fry of *Isocardia cor* is proved, by a complete series of ages, to be identical with *Kellia abyssicola*, Forbes, *Venus miliaris*, Phil., and *Kelliella abyssicola*, Sars. "Some of Forbes Ægean specimens, named by him *Kellia abyssicola*, belong to *Axinus ferruginosus*, and others to the present species; his description will suit either."

*Naera obesa*, Lov., is distinct from *N. cuspidata*, to which latter the author referred it in his British Conchology.

The animal of *Scissurella crispata*, Fleming (of which *S. angulata*, Loven, is a synonym), is described.

*Rissoa turgida*, nov. spec.

*Cerithium perversum*, Linn., belongs to the genus *Triforis*.

*Taranis* is the name of a new genus proposed for *Trophon Morchi*, Malm., = *Bela demersa*, Tiberi. It has no operculum; the canal is very short and sculpture peculiar.

*Cylichna acuminata*, Brug., belongs to the genus *Rhizorus*, Montf., or *Volvula*, A. Ad.

**No. 31**, July, 1870.

*Mediterranean Mollusca.* By J. Gwyn Jeffreys.

This paper embodies the results of several dredgings in various parts of the Mediterranean, principally from greater depths than heretofore examined. "Not the least interesting result from all these Mediterranean dredgings consists in the discovery, in a living or recent state, of several species which had previously been known as fossil only, and were considered extinct. More extended investigation and gradual experience confirm my opinion, published eight years ago (Brit. Conch. i, Introd.), that probably all the Mollusca which lived during the periods represented by our newer Tertiary strata still survive in some part or other of the European seas."

*Leda acuminata*, Jeffreys. Nov. sp.
*Dentalium gracile*, " "
*Hela*. Nov. gen. type *Lacuna tenella*, Jeffreys.
*Odostomia nitens*, Jeffreys. Nov. sp.
*Actæon exilis*, " "

**No. 32**, August, 1870.

*On some Genera and Species of Gasteropodous Mollusca collected by Mr. M'Andrew in the Gulf of Suez.* By ARTHUR ADAMS.

*Ceratia pyrgula.*
*Microstelma concinna.*
*Rissoa gracilis.*
*Hyala nitida.*
" *concinna.*
" *pumila.*
*Diala succincta.*
*Scalenostoma Deshayesii,*
*Corena*, n. gen. allied to *Onoba.*
" *tuberculifera.*
*Styliferina callosa.*
*Syrnola lucida.*
*Orina pinguicula.*
*Styloptygma nivea.*
*Agatha vitrea.*
*Mormula Macandreæ.*

---

FRENCH.

**Journal de Conchyliologie.** 3d Ser. x, No. 3. Paris, July, 1870. 86 pp. 8vo, with one colored and two plain plates.

*Note sur quelques espèces du genre Doris décrites par Cuvier.* By P. FISCHER.

The author, comparing the types in the Museum of Natural History with the descriptions, makes the following determinations:

*Doris tuberculata.* This is the same species as *D. tuberculata* of Alder and Hancock.

*Doris stellata* and *D. lævis*, both = *D. pilosa* Müller.

*Habitat parasitaire des Mollusques,—Mollusques parasites des Holothuries.* By Dr. A. MANZONI.

*Diagnoses Molluscorum novorum, reipublicæ Mexicanæ et Guatemalæ incolarum.* By H. CROSSE and P. FISCHER.

*Limax Guatemalensis.* *Zonites Tehuantepecensis.*

*Description de trois espèces nouvelles d'Helix d'Espagne.* By Dr. J. G. HIDALGO.

*H. Montserratensis,* *H. semipicta.*
*H. Zapateri.*

*Diagnoses Molluscorum Novæ-Caledoniæ incolarum.* By H. CROSSE.

*Scaliola Caledonica,* *Helix multisulcata.*

*Description d'espèces nouvelles de Coquilles marines des côtes d'Australie.* By JOHN BRAZIER.

*Conus Cooki,* *Conus Rossiteri.*

*Diagnoses Molluscorum novorum.* By H. CROSSE.

*Bulimus Kuhnholtzianus*, *Trophon Petterdi*,
*Purpura porphyroleuca*, *Fossarina Petterdi*,
*Marginella Angasi.*

*Description d'espèces nouvelles provenant de l'ile Maurice.* By E. LIENARD.

*Conus Julii*, *Leptoconchus Robillardi.*

*Note sur le Physa capillata, de l'ile Crète.* By J. B. GASSIES.

*Note sur une espèce nouvelle d'Avellana du lias supérieur.* By E. DUMORTIER.

*Descriptions d'espèces nouvelles du bassin de Paris.* By Dr. A. BEZANCON.

*Description de Coquilles fossiles des terrains tertiaires inférieurs* (continued). By M. C. MAYER.

*Catalogue des Mollusques fossiles des marnes bleues de Biot, près Antibes (Alpes-Maritimes).* By ALFRED BELL.

*Description de plusieurs espèces fossiles d'Auriculacés des terraines tertiaires supérieurs.* By M. R. TOURNOUER.

*Bibliographie. Nouvelles.*

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**Revue et Magasin de Zoologie.** Conducted by Guerin-Méneville. No. 5. Paris, May, 1870.

*Mollusques nouveaux, litigieux ou peu connus.* By M. J. R. BOURGUIGNAT. Continued.

*Helix Henoniana.* Algiers. *Limnæa Martorelli.* Spain.
*Valvata Coronadoi*, Spain. *Sphærium Hispanicum*, "

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**Actes de la Societe Linneenne de Bordeaux.** 3d Ser. iv, Part 6. Bordeaux, 1870.

*Description de l'ile de Crete.* By M. V. RAULIN.

In this paper is included a list of the terrestrial fluviatile and marine mollusks, as determined by Messrs. Deshayes and Gassies.

*Physa capillata*, Gassies. Nov. spec.

There are useful tables of the bathymetrical distribution of the species appended to the paper.

**Vol. VII**, Part 1. Bordeaux, 1870.

*Melanges Malacologiques.* By M. C. Recluz.

1. *Table de la Classification des Mollusques lamellibranches.*

2. *Monographie du genre Jagonia, Recluz*, 1853.

This genus includes species described as Lucinas, and belonging to the type of *Lucina pecten*, Lam., *L. reticulata*, Poli, *L. squamosa*, Brug., *L. muricata*, Chemn., etc.

3. *Quelques observations sur les Littorines, et catalogue des espèces.*

4. *Description du Souleyetia, nouveau genre de coquille bivalve.*

*S. Moulinsii*, Récluz. Isl. Borneo.

This genus appears to be related to *Anatina.*

5. *Description de deux espèces de Lavignons.*

*L. Deshayesii.* Gulf of St. Tropês in Provence.
*L. Moulinsii.* Languedoc and Hérault.

The author includes in his genus three other species, viz., *L. calcinella*, Adanson, *L. piperatus*, Belon, *L. lacteus*, Lam., usually known as *Scrobicularia.*

6. *Qu'est-ce que le Turbo clathrus de Linné et le Venus decussata du même auteur?*

7. *Observations sur l'Onchidium Celticum de Cuvier.*

8. *Extract from a letter to Ch. des Moulins, President of the Linneén Society, on certain species of Solen, with an additional note relative to Solen curtus.*

*Faune Conchyliologique marine du département de la Gironde.* Supplément. By Dr. P. Fischer.

This is an important addition to the author's work, published under the foregoing title, as it embraces one hundred and sixty-eight additional species inhabiting the south-east coasts of France, making the whole number catalogued three hundred and forty-six species.

GERMAN.

**Systematisches Conchylien-Cabinet von Martini und Chemnitz.** 199th Part. 4to. Nurnberg, 1870.

Contains continuation of monograph of *Venus*, with plates 35—38, illustrating the genus.

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**Novitates Conchologicæ.** Supplement III. Monographie der Molluskengattung Venus, Linné. By Dr. Edward Römer. 24th and 25th Parts, with six colored plates.

In this issue is commenced the monograph of the sub-genus *Tapes*.

# APPENDIX.

## LIBRARIAN'S REPORT.

The Librarian respectfully reports that there have been presented, during the past year, to the library of the Conchological Section, 104 pamphlets, 3 volumes and an almost complete suite of the publications of the Academy. Of these, 27 were received from Societies, 32 from Editors, 32 from Authors, 6 from Publication Committee, 6 from Geo. W. Tryon, Jr., 2 from Isaac Lea, 1 from Prof. Marsh, and 1 from P. P. Carpenter.

The Proceedings and Journal of the Academy were received from J. S. Phillips.

In addition, 26 pamphlets and continuations of Conchological works have been received through the Academy.

The work of transcribing the revised Catalogue of the Library has been carried on during the year as rapidly as circumstances would permit.

All of which is respectfully submitted,

EDWARD J. NOLAN, *Librarian.*

## CONSERVATOR'S REPORT.

The Conservator of the Conchological Section respectfully reports that the donations to the Cabinet, during the year, have been as follows:

From REV. E. R. BEADLE. Ten species of Mollusca, principally from St. Martin's, W. I.

H. F. CARPENTER. *Limnea columella*, Say, from Providence, R. I.

J. C. Cox. One hundred and thirty-four species of Australian and Polynesian land, fresh-water and marine shells.

A. O. Currier. A collection of land and fresh-water shells from Nicaragua, including types of several new species forming part of the collections of the MacNiel Expedition to Central America. A collection of *Limnæidæ* and *Viviparidæ* from Kent County, Mich.

W. H. Dall. Two species of *Physa* from Arizona and Nicaragua. *Gadinia reticulata*, Say, from Monterey, Cal., and one unknown species of *Gadinia*.

H. A. Gilliat. Fifty-seven species of Australian marine shells.

F. A. Hassler, M. D. Model of animal of *Strombus gigas*, Linn. Suite of specimens of *Helix sphracita*, Hartm., from Syria.

F. V. Hayden, M. D. Six species of fresh-water shells, from Ancient Lake margins, Salt Lake, Utah.

G. A. Lathrop. Five species of *Helices* from Tennessee.

Isaac Lea. Types of *Physa Carltoni* and eight species of *Unio* from Big Black River, Wis.

M. L. Leach. *Pomatiopsis lapidaria*, Say, from St. Louis, Mich.

J. A. McNeil. *Unio Macneilii* and a species of *Melania*.

M. McDonald. *Leucocheila fallax*, Say, and *Triodopsis introferens*, Bland, from Lexington, Va.

F. B. Meek. *Tiara humerosa*, Meek, from Utah—fossil.

C. W. Peale. Specimens of *Glandina*.

W. H. Pease. *Melania Kauaiensis*, *Limnea rubella*, Lea, *L. turgidula*, *L. ambigua*, and *L. compacta*.

J. S. Phillips. Two species of *Marginella; Aricia Scottii*, Brod.; *Porcellana erythræensis*, Beck.

J. H. Redfield. *Cyclophorus Nilagiricus*, Benson; fourteen species of *Auriculidæ*, eight species of *Ringicula*, and nine species of *Cylindrella*.

S. R. Roberts. *Helix alternata*, Say, from Niagara Falls.

Rev. J. Rowell. *Goniobasis circumlineata*, Tryon, and a species of *Physa*.

W. S. W. Ruschenberger. Two specimens of *Spondylus Delessertii*, Chemn., from Navigator's Island.

Mrs. Lucy W. Say. A rayed specimen of *Unio cylindricus*, Say, from the Wabash river.

John Wolf. *Pleurocera Lewisii*, and *P. subulare*, Lea, from Illinois River, Canton, Ill.; two species of *Physa*; two species of *Limnæidæ*; *Amnicola parva*, Lea, *A. rustica*, Say, and *A. decisa*, Hald., from Illinois; eleven species of *Unionidæ* and one of *Sphærium*, from Canton, Ill.

The following were purchased with funds received from the sale of duplicates: *Cataulus hæmastoma*, from India; *Helix Skinneri*, Reeve, from Ceylon; twenty-eight species operculate land shells from West Indies, new to collection, named by Thos. Bland, and six species of *Cylindrella*.

A collection of one hundred and fifty-two species was sent to Sylvanus Hanley for shells received from him in 1869. A similar collection was sent in exchange to Dr. J. C. Cox, of Sydney, N. S. W.

Selections from the publications of the Section were sent in exchange to E. A. Bielz, of Hermannstadt, F. de Malzine, of Bruxelles, E. von Martens, of Berlin, M. Petit de la Saussaye, of Paris, W. H. Pease, of Honolulu, Paul Terver, of Lyons, and Ralph Tate.

In consequence of the comparative completeness of our collection in many of the families, we have been forced to decline exchanging with foreign naturalists, except when they are able to furnish us with specified desiderata.

Through the liberality of Messrs. Joseph Jeanes, J. H. Redfield, Wm. L. Mactier and W. S. Vaux, we have been enabled to place sixty-four drawers under the horizontal cases. These drawers afford accommodations for the arrangement of the following families: the *Porcellanidæ*, *Cylindrellidæ*, *Cyclostomacea*, *Auriculacea*, the *Helices*, except the North American species, the *Slugs*, *Vitrinæ*, *Succineæ*, and part of the *Corbiculadæ*.

During the year, 10,060 shells have been cleansed, oiled, labelled and placed in 3771 trays. Fifty beautiful sections, illustrating the genera arranged, have been prepared by Dr. F. A. Hassler.

Your Committee on the Arrangement of the Collection have met frequently and devoted much time to the performance of the duty assigned them. They have reason to refer with satisfaction to the above summary of the results of their labors.

All of which is respectfully submitted,

Edward J. Nolan, *Conservator.*

## REPORT OF PUBLICATION COMMITTEE.

HALL OF THE ACADEMY OF NATURAL SCIENCES,
*Philadelphia, Dec. 1st*, 1870.

The Publication Committee of the Conchological Section reports its transactions for the year 1870:

Parts 3 and 4, Vol. FIFTH, American Journal of Conchology, containing together 125 pp. and four colored plates, were issued Feb. 3d and May 5th respectively. Of the current (6th) volume, two Parts have been published, the dates of issue being July 7th and Nov. 3d. These two parts contain 290 pp., illustrated by nine plates and numerous wood engravings. The aggregate number of pages of the Journal issued is 415.

Vol. 6th, Part 3d, is now in the printer's hands, and Part 4th, completing the SIXTH Volume, will embrace the papers and reports presented for publication this evening.

Besides the Journal, your Committee has published:

"Catalogue of Recent Mollusca," Part 5, containing Marginellidæ, by John H. Redfield, and Melanidæ, by Aug. Brot, M. D. 110 pp. Nov., 1870.

Monograph of the Fresh-water Univalve Mollusca of the United States, by Geo. W. Tryon, Jr., Part 1, 82 pp., 6 colored plates. July, 1870.

The subscription list of the Journal has again increased, so that it is nearly or quite self-sustaining, and, in congratulating the Section upon this very satisfactory evidence of the importance and value to conchologists of its official publication, we can reasonably anticipate that in the early future a reduction of the subscription price will become practicable without involving the Section in loss.

Quite a number of complete sets of the Journal have been sold during the year, so that our supply of the early volumes has become scant. We recommend that the price for complete sets be increased to six dollars per volume.

Respectfully submitted by

GEO. W. TRYON, JR.,
S. R. ROBERTS,
EDWARD J. NOLAN,
*Publication Committee.*

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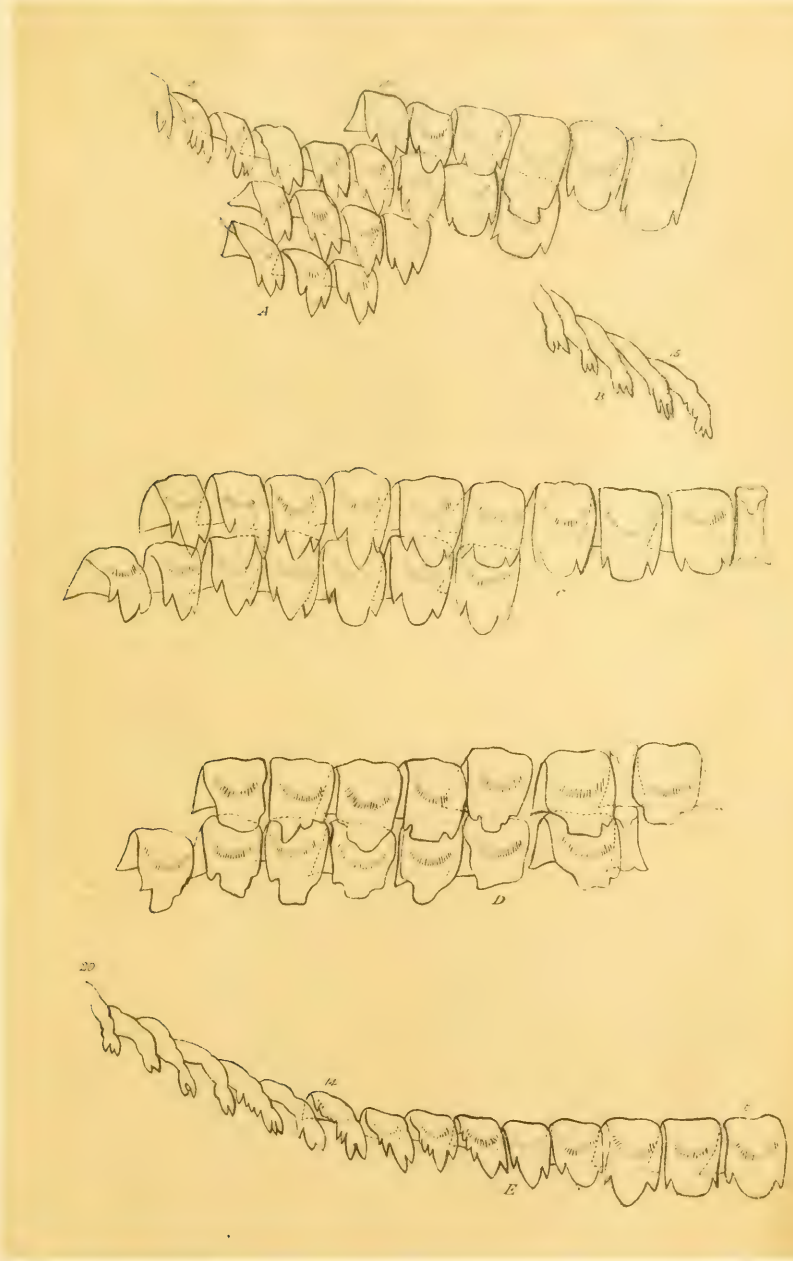


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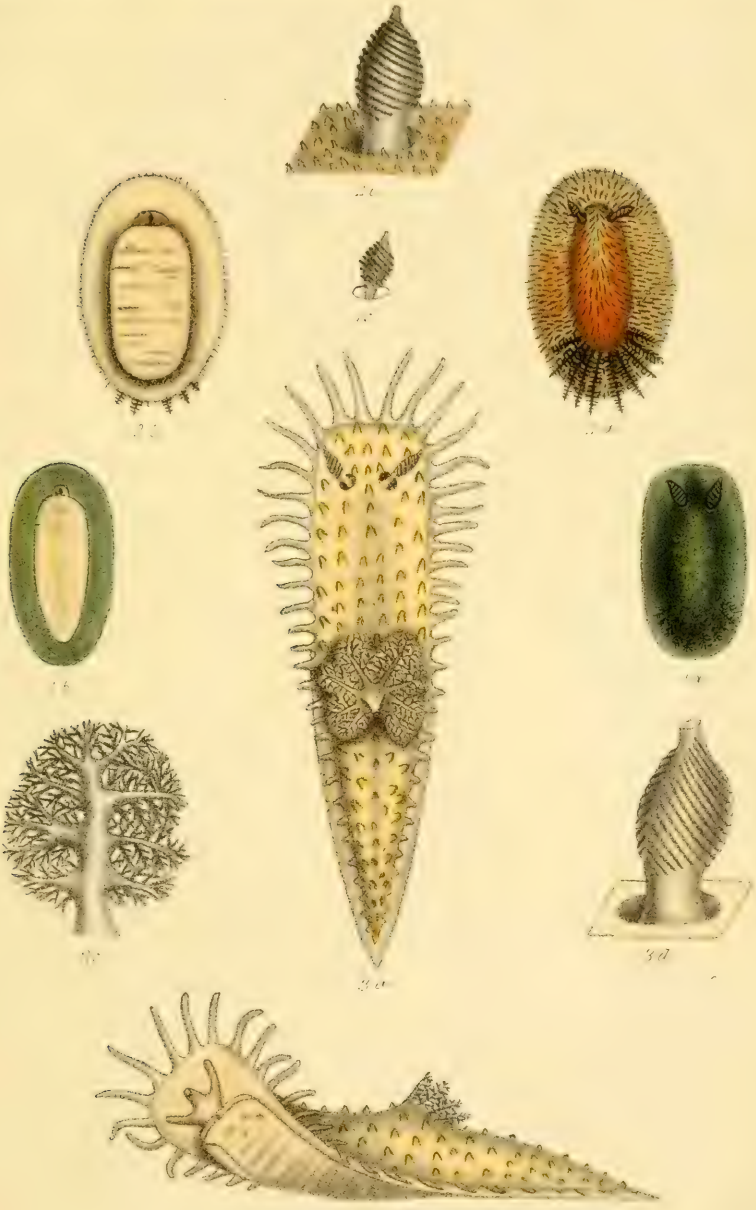

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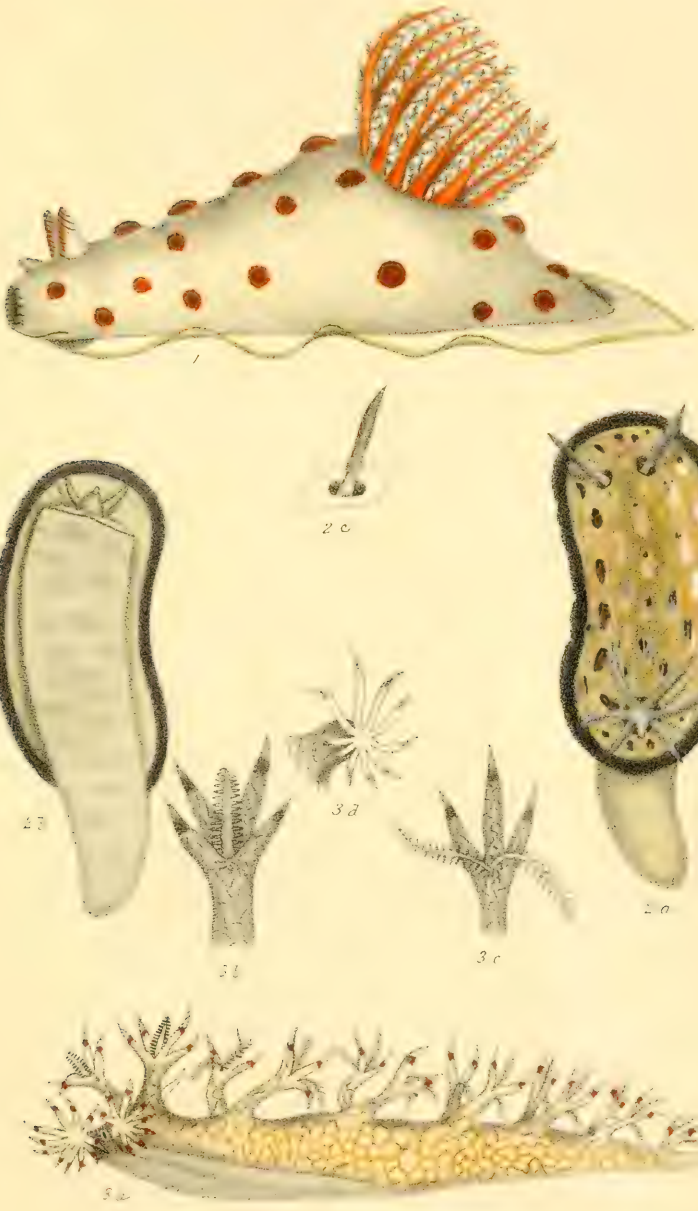


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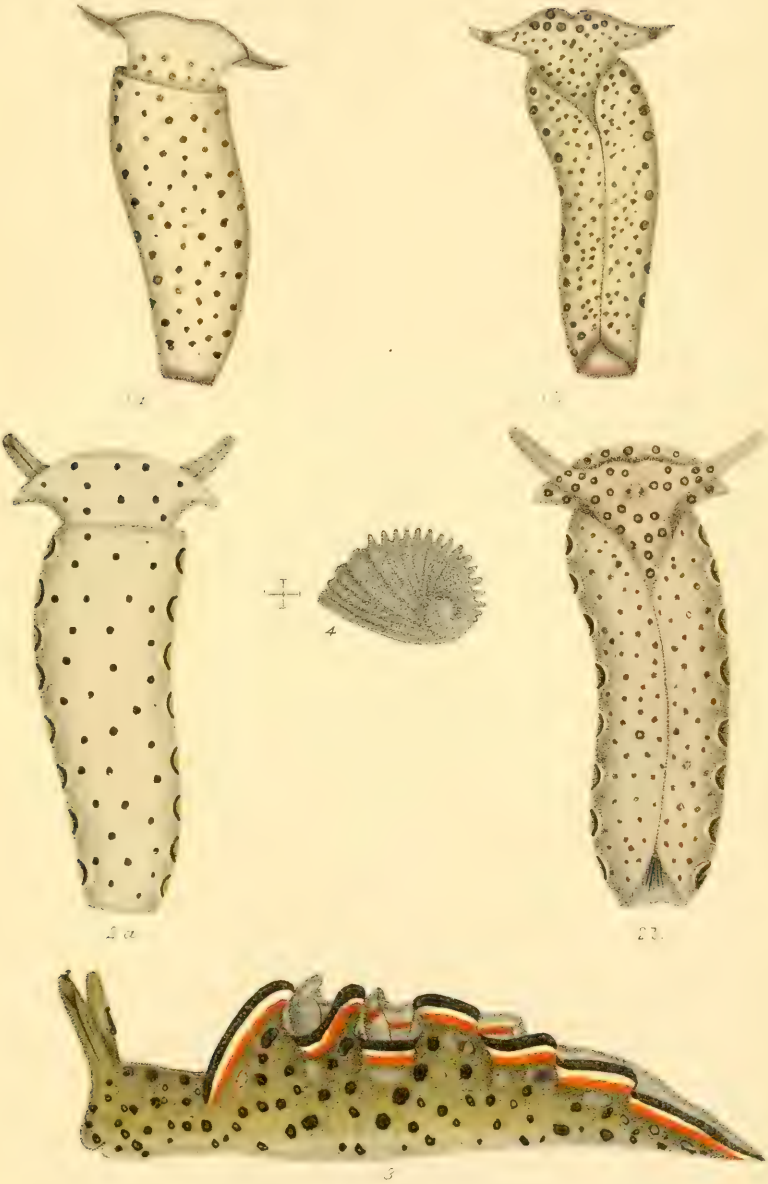

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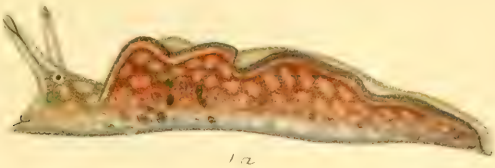

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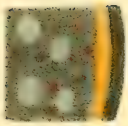

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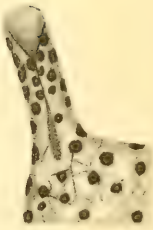

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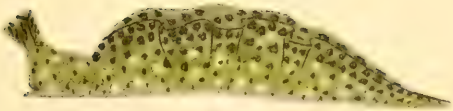

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